AEROWORKS

150cc YAK 54 ARF-QB

(Quick Build)

ASSEMBLY MANUAL

AEROWORKS
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Thank you for choosing the Aeroworks 150cc Yak 54 ARF-***QB***. We put great effort into making this plane the best model you will ever build and fly. We have provided you with the highest quality kit and performance possible. We wish you great success in the assembly and flying of your new Aeroworks 150cc Yak 54 ARF-***QB***.

!WARNING!

An R/C aircraft is not a toy! If misused, it can cause serious bodily harm and property damage. Fly only in open areas, and AMA (***Academy of Model Aeronautics***) approved flying sites. Follow all instructions included with your plane, radio, and engine.

Aeroworks manufacturing guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This limited warranty does not cover any component parts damaged by use or modification. In no case shall Aeroworks liability exceed the original cost of the purchased kit. Further, Aeroworks reserves the right to change or modify this limited warranty without notice.

In that Aeroworks has no control over the final assembly or materials used for final assembly, No liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

We, as the kit manufacturer, have provided you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and fly ability of your finished model depends on how you build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

INTRODUCTION

Your new 150cc Yak 54 ARF-***QB*** is a highly aerobatic airplane. It is capable of both precision and 3-D maneuvers. The aircraft builds easily, quickly, and precisely due to its state of the art CAD design, LASER cut technology, and high quality included hardware. We hope you enjoy building and flying your 150cc Yak 54 ARF-***QB***.

Great care has been taken in both the design and manufacturing of the 150cc Yak 54 ARF ***QB*** to allow for the strongest and lightest construction possible. Only the highest quality materials from the covering, paint, wood and hardware have been used in the construction of this model.

The 150cc Yak 54 ARF-***QB*** has been individually hand built, covered and painted by trained and experienced craftsmen with over 25 years of manufacturing experience. Using CAD design, laser cut technology and jig-built assures accuracy in all stages of production.

The 150cc Yak 54 ARF-***QB*** is designed for gas engines in the 150cc category. The DA-150cc engine is shown in the assembly instructions. The aircraft was tested with the DA-150cc and has outstanding performance. The final choice of engine is left up to the builder. A computer radio is recommended to allow the pilot to take advantage of the full capabilities of this aerobatic aircraft.

IMPORTANT Please read through this assembly manual carefully, before starting the assembly of your new model. Inventory and inspect all parts and hardware for any imperfections or damage. Notify **Aeroworks immediately** if there are missing or damaged parts and do not proceed with the assembly.

INTENDED USE

This plane should not be regarded as a toy. This is an aerobatic plane and is recommended for pilots who are beyond the trainer-stage and are comfortable with flying an aerobatic sport plane.

READ! ***LIMITED WARRANTY*** ***READ!***

It is important to notify Aeroworks of any damage or problems with the model within **30 days** of receiving your airplane to be covered under warranty. If you wish to return this aircraft for any reason a 15% restock fee will be charged to the customer. In addition the customer is responsible for all return shipping cost and all prior shipping cost will not be refunded. Parts will be exchanged or replaced once the original item is returned at the owner's expense. If you have any problems or questions, please contact Aeroworks.

Aeroworks cannot insure the skill of the modeler and cannot influence the builder during the construction or use of this aircraft, and therefore, will not be accountable for any property damage, bodily injury or death caused by this aircraft.

Aeroworks cannot insure the skill of the modeler and cannot influence the builder during the construction or use of this aircraft, and therefore,

The purchaser/operator accepts all responsibility of any and all structural or mechanical failures.

KIT CONTENTS

150cc Yak 54 ARF-*QB*

Basic Aircraft Parts:

Fuselage - vertical fin installed – covered, engine box & firewall installed - fuel-proofed - pre installed canister mount - pre drilled for mounting of the tail wheel assembly.

- (8) 8-32 blind nuts installed for main landing gear
- (4) 4-40 blind nuts installed for the mounting of the stab
- (6) 4-40 blind nuts installed for the mounting of the cowling
- (2) 4-40 blind nuts installed for the mounting of landing gear hatch covers
  Landing gear hatch covers installed by (2) 4-40x20mm hex style bolts and (2) #6 bonded washers
- (4) 4-40 blind nuts installed for canister access hatch
  Canister access hatch pre installed by (4) 4-40 x 16mm hex style bolts and (4) #6 bonded washers
- (8) 4-40 blind nuts installed for mounting the pipe brackets
- (1) Top hatch cover of engine box, pre installed by (4) T2.6 x 10mm PWA wood screws
- (1) Canopy base-painted, installed on the fuselage by (4) 4-40 blind nuts and (4) 4-40x16mm hex style bolts
- (1) Tinted Canopy—glued on the canopy base and painted
- (4) #6 bonded washers for the mounting of the canopy base
- (4) 3mm split lock washers for the mounting of the canopy base
- (2) 3.5(o.d.) x 1250mm Antenna guide tube installed
- (2) 3.5(o.d.) x 80mm rudder pull-pull exit tubes Installed
- (2) Elevator servo draw strings installed

Left Wing with Aileron – covered: Pre-drilled for the mounting of the control horns

- (2) 8-32 blind nuts installed for the wing mounting.
- (2) Aluminum anti-rotation dowels - installed pre-drilled hole for cotter pin installation
- (11) pin point hinges (**glued**) Read to fly
- (2) Aileron servo pull strings installed

Right Wing with Aileron – covered: Pre-drilled for the mounting of the control horns

- (2) 8-32 blind nuts installed for the wing mounting.

(2) Aluminum anti-rotation dowels - installed pre-drilled hole for cotter pin installation
(11) pin point hinges installed (**glued**) Read to fly
(2) Aileron servo pull strings installed

Horizontal Stabilizer with elevator assembly—covered
(14) seven per elevator, pin point hinges (**glued**)
- Ready to fly
Elevators Pre-drilled for the mounting of the control horns

Rudder with (9) pin point hinges (**not glued**) – covered Rudder Pre-drilled for the mounting of the hinges, control horns and tail wheel steering arm.

SUB ASSEMBLIES:

#1:
(1) Fiberglass Cowling- painted - top and bottom - with pre cut hot air exit slots and front engine baffling installed.
(2) 4-40 x 25mm hex bolts for mounting inside center section of cowl to fuse
(4) 4-40 x 20mm hex bolts for mounting inside top section of cowl to fuse
(4) 4-40 x 16mm button head hex bolts for mounting outside bottom section of cowl to fuse.
(10) #6 bonded washers for mounting cowling
(10) 3mm split lock washer for mounting cowling

#2:
(2) **Carbon** main landing gear, 1 left and 1 right
(2) 5 x 48mm Axle Bolts
(2) M8 lock nuts
(4) 5mm i.d. Wheel Collars with set-screws
(2) 115mm Dia. Main Wheels (Lite Type)
(4) 4-40x16mm hex style bolts for mounting wheel pants
(4) 3mm flat washer for mounting wheel pants
(4) 3mm split ring lock washer for mounting wheel pants
(8) 8-32x30mm hex head bolts for mounting main landing gear
(8) 4mm flat washers for mounting main landing gear
(8) 4mm split ring lock washers for mounting main landing gear.

#3:
(2) Wheel Pants- Painted- pre mounted- 1 Left and 1 Right--
(4) 4-40 blind nuts installed in the wheel pants, 2 per side.

#4:
(1) AW- Custom **Carbon** Tail Wheel Assembly
(1) Aluminum steering arm and mounting screws
(2) Steering springs

#5:
(1) 40mm O.D. x 1240mm **Carbon** wing tube
(1) 16mm O.D. x 220mm **Carbon** stab tube - Front
(1) 16mm O.D. x 460mm **Carbon** stab tube - Rear
(4) 8-32 x 30mm Hex head bolts for wing mounting
(4) #8 bonded washer for wing mounting
(4) 4mm split ring lock washers for wing mounting
(4) 4-40x16mm Hex style head bolts for stab mounting
(4) #6 bonded washer for stab mounting
(4) 3mm split ring lock washers for stab mounting
(4) 1.8mm cotter pins - Second method -wing mounting for security

#6:
(6) 4-40 3" Two end threaded pushrod with nuts for ailerons
(4) 4-40 2 1/2" Two end threaded pushrod with nuts for elevators
(2) 4-40x300mm One end threaded pushrod –Throttle and Choke
(2) 4-40 solder coupler - Throttle and Choke
(2) 4-40 Metal clevises - Throttle and Choke
(12) Brass spacers – 6 for ailerons; 4 for elevators; 1 for throttle; 1 for choke
(22) 4-40 Ball Links – 12 for ailerons; 8 for elevators; 1 for throttle; 1 for choke
(22) 4-40 x 16mm hex style bolts
(22) 4-40 lock nuts
(12) Flat washer for top of ball links
(1) 500mm **Carbon tube**- pushrod reinforcement

#7:
(2) 1.2x1500mm plastic coated pull-pull steel cable.
(4) 4-40 Metal R/C links with nuts
(4) 3.5 x 5mm brass pull-pull swaging tubes
(12) AW double control horns
(72) T2.6 x 16mm Phillips head mounting screws
(4) 4-40 Ball Links - Rudder
(4) 4-40 x 16mm hex style bolts
(4) 4-40 lock nuts
(2) Brass spacer
(2) Flat washer for top of ball links

#8:
(1) 1500cc (50 ounce) Gas Fuel Tank assembly (Fuel)
(1) 1000cc (34 ounce) Gas Fuel Tank assembly (Smoke)
(1) 5ft. large gas fuel line
(4) Brass barbs for fuel line

#9:
(2) Throttle – Choke servo mounting plates
(4) Engine mounting templates (DA150 –170, 3W150 - 157, ZDZ 160 and ZDZ J-160)
(2) pre cut balsa sheet for canister tunnel
(2) Pipe mounting brackets - Plywood
(8) 4-40 x 16mm hex head bolts—mount brackets
(8) 3mm flat washer
(8) 3mm split ring lock washer
(16) 11mm O.D. x 20mm silicon tubes – canister pipe
(6) Rubber grommets - fuel line guide
(1) Cowl template - cutting muffler stack exit holes

(1) 180x120x6 mm foam - Fuel tank
(1) 160x 100x6mm foam - Smoke tank
(3) 300x80x8mm foam - Receiver and battery
(8) 8x450mm Nylon ties - fuel line
(10) 3x150mm Nylon ties - fuel tank
(6) 356x12.5 Velcro one wrap strap - Receiver and battery

#10: Ultracote™

(1) 300x300mm Midnight Blue #885 - Small repairs
(1) 300x300mm True Red #866- Small repairs
(1) 300x300mm White #870 - Small repairs
(1) 300x300mm Dark Yellow #889 - Small repairs
(1) 600x300mm Transparent covering -Sealing hinge gaps

#11:

(24) 6mm machined aluminum engine stand offs
(1) Plywood Engine stand off - DA 150

#12:

(1) AW - Custom throw meter – measure control surface deflection
(1) AW - Custom paper rudder deflection meter

#13:

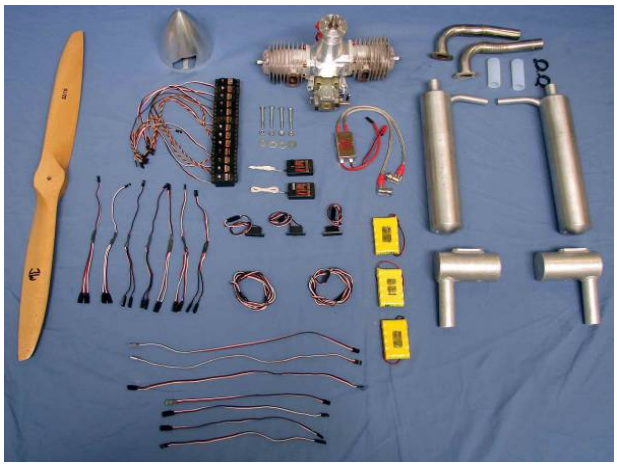
(1) Custom -Vinyl Decal Set

#14

(1) Assembly manual with picture folders on CD

ITEMS NEEDED TO COMPLETE

Hardware:



- 150cc gas engine with ignition, mufflers or headers, with canisters or pipes, and all engine mounting bolts, lock nuts, and washers.
- 5” Spinner and propeller of your choice
- 6 x aileron servos (min. 180 in./oz. Digital, Metal Gear)
- 2 or 3 x rudder servos (min. 180 in./oz each or 500 in./oz. total torque, Digital, Metal Gear)
- 4 x elevator servos (min. 180 in./oz. Digital, Metal Gear)
- 1 x throttle servo (fast / reliable)
- 1 x choke servo (fast / reliable) (***Optional***)
- Servo extensions - ***Heavy Duty*** - (22 gauge min) 7 (***2 Rudd***) *or* 8 (***3 Rudd***) x 11” Y harness, 2 x 6,” 2 x 12”, 2 x 18”, 2 x 24”, 2 x 36”, 2 x 48”
- 2 Receivers (**PCM recommended**)
- 2 x Receiver battery (min 6.0 volt / 1700ma)
- 1 x Ignition battery (min 4.8 volt / 1700ma)
- 3 switches with charge jacks (22 Gauge min)

Tools:

- Allen wrenches US and Metric.
- Dremel cutting disc and sanding drum tool
- Electric drill and selection of bits
- Flat head screwdriver
- Hobby heat gun
- Hobby iron with protective sock
- Masking tape
- Modeling knife
- Needle nose pliers or crimping tool
- Paper towels
- Pen, pencil or felt tipped marker
- Phillips screwdriver
- Ruler and tape measure
- Scissors
- T pins
- Waxed paper
- Wire Cutters

Adhesives:

- 15-30 Minute epoxy
- Blue Loctite **(Thread Locker)**
- Epoxy mixing cups, sticks, brushes
- CA kicker (optional)
- Thick and Thin CA
- Rubbing alcohol
- Wipes

!WARRING!
Some rubbing alcohols may attack painted parts.

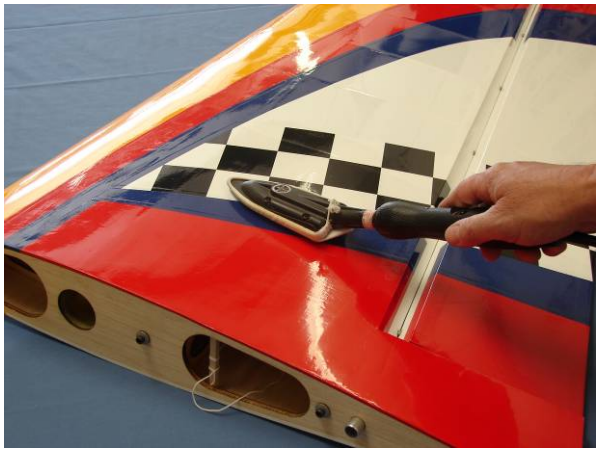
TIGHTENING AND RE-SHRINKING THE COVERING

1. Open your kit slowly and take care not to damage any parts of the kit. Remove all parts from their plastic protective covers for inspection. Before doing any assembly or installation of any decals it is **very important** to re-shrink or re-tighten the already applied covering. Due to the shipping process, heat and humidity changes from different climates, the covering may become lose and wrinkle in the sun. If you take the time to re-tighten the covering, you will be rewarded with a long lasting beautifully covered model.

2. Using your covering iron with a soft sock, gently apply pressure and rub in the covering. If any bubbles occur, your iron may be to hot. Reduce heat and work slowly.

!IMPORTANT!

Go over any and all seams and color overlaps with your iron to assure good adhesion of the covering to the wood. This is especially important at the leading edges of the wings and stabs.



3. If bubbles persist, use a small pin to punch holes in the bubble to relieve trapped air and reheat.

4. Use your heat gun with extreme caution. Take care not to apply too much heat to one area for long periods of time. This may cause the trim colors to over shrink and pull away leaving unsightly gaps on the color lines. The trim stripes are especially vulnerable to over heating and over shrinking.

5. You model is covered with Ultracote™ covering. In case of repairs, the colors are:

Midnight Blue	**#885**
Dark Yellow	**#889**
True Red	**#866**
White	**#870**

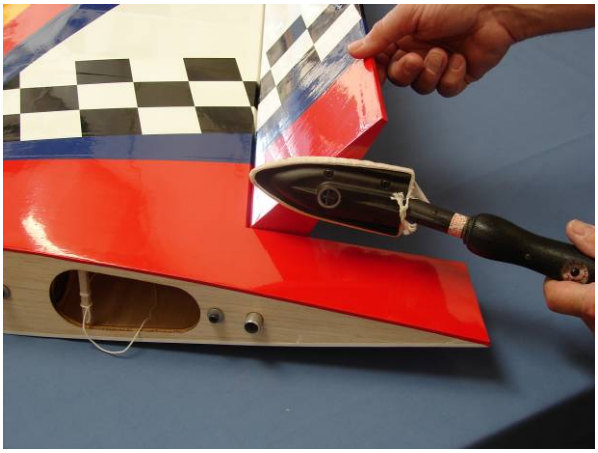
Tightening and re-shrinking the covering is now complete. However, this is a never ending process and should be checked after each flying session.

CHECKING SEAMS AND COLOR OVERLAPS FOR GOOD SEAL
SEALING HINGE GAPS

1. Go over all seams and color overlaps with your sealing iron.

Note: Even if your models covering has no wrinkles out of the box it is still very important to go over all seams and overlaps to make certain they are sealed securely. This is especially important at the leading edges of the wings and stabs. We recommend checking the covering after each flying session.

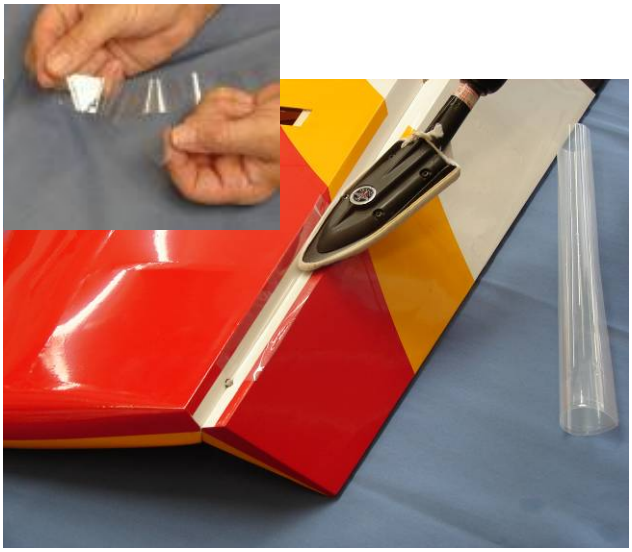
2. Use covering iron to ensure all edges, seams, and color overlaps are securely sealed.



3. Sealing hinge gaps. This is an optional step but is recommended.

   Cut strips of the supplied clear covering to fit the hinge gaps. Use covering iron to seal the clear covering snugly into the bottom of the hinge lines as shown for air tight hinge seals.

Note: The clear covering does have a transparent protective backing. This must be removed prior to applying heat and to the surface.



IMPORTANT:
It is the responsibility of the purchaser / operator to check the covering seams and overlaps for security and a good seal.

Aeroworks is not responsible for failure of covering seams or overlaps during flight.

Note: If covering continues to lift apply a small amount of thin CA underneath the covering. Then using a clean rag apply pressure to secure.

One of the most important tools in your flight box is a roll of clear tape. This can be used at the field for fast and easy repairs of the covering. Then once you have finished flying the covering can be permanently repaired.

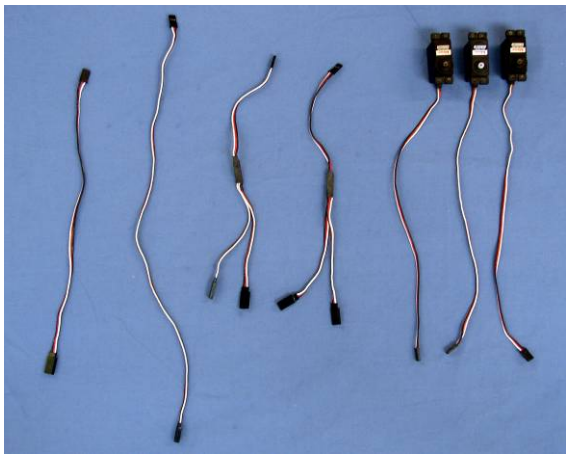
WING ASSEMBLY

Aileron Servo Installation

1. The ailerons have been pre-hinged and **glued** to the wing panels and are ready for flight. No other steps are necessary for hinging. Clear Covering is supplied for sealing the hinge gaps if desired. However, due to the precisely aligned and minimal hinge gap this step is optional.

Gather one wing panel, three aileron servos, two 11" Y harnesses, one 24" and one 36" servo extension as shown below to begin the servo installation.

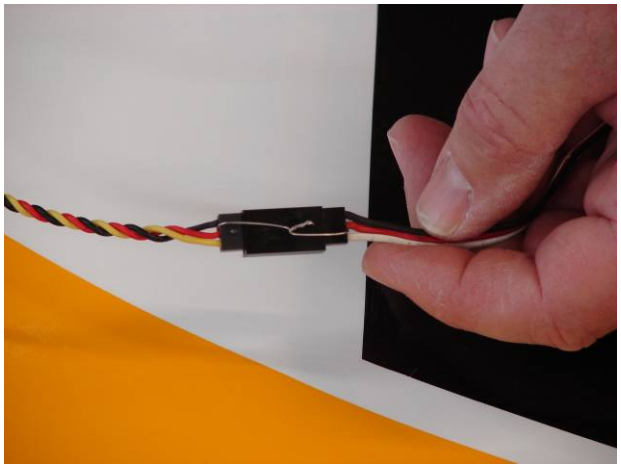
Note: A 6" extension will also be needed per wing when connecting aileron servos to receiver.



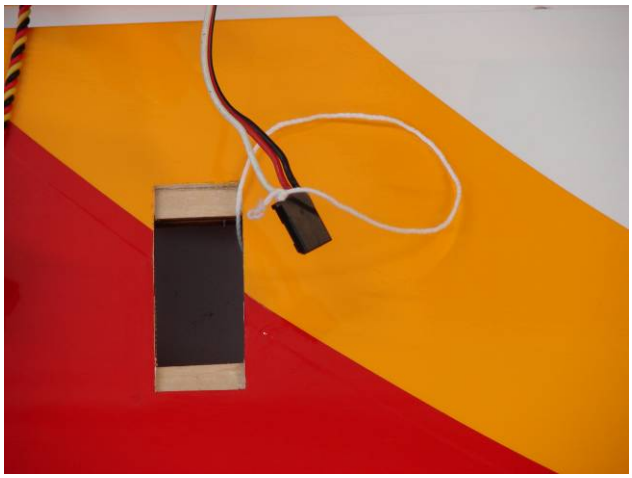
2. Layout the servos, extensions and Y harness on the wing to test fit the installation and ensure servo leads are the correct length.

Minimum recommended servo:
180 in. oz. / Metal Geared / Digital

3. Attach the 36" extension to the outboard servo lead and the 24" extension to the middle servo lead and secure with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension.

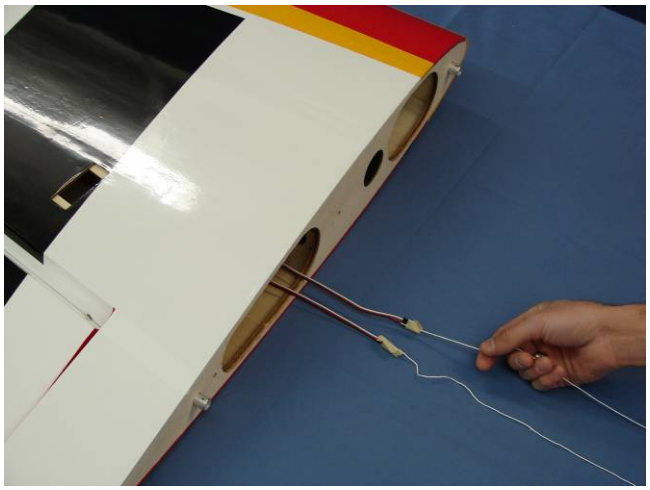


4. Remove the balsa stick with the pull string from both servo wells and tie the pull strings to the servo leads as shown.



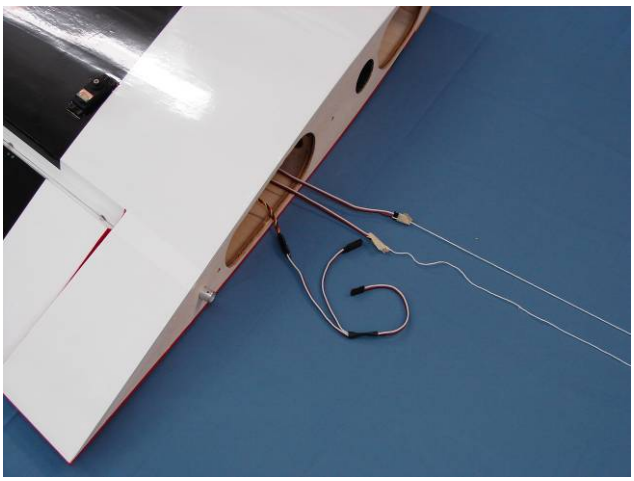
5. Secure with tape so that the string pulls from the front end of the connector to assist in drawing the servo wire through the wing without hanging up inside the wing.

6. Pull both servo leads through the root end of the wing.

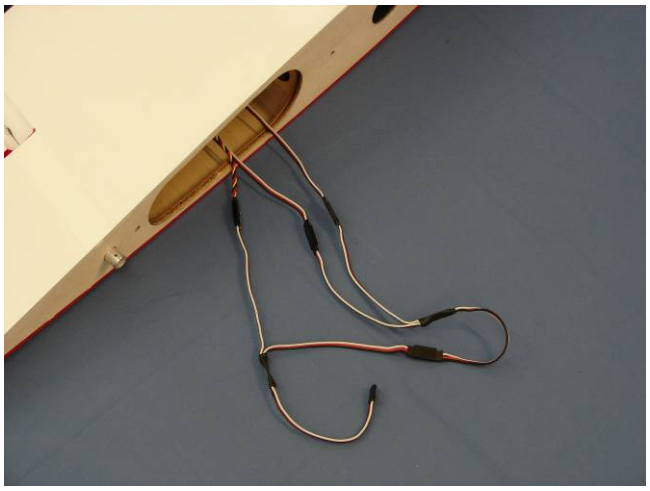


7. Attach a Y harness to the inboard servo as shown below.

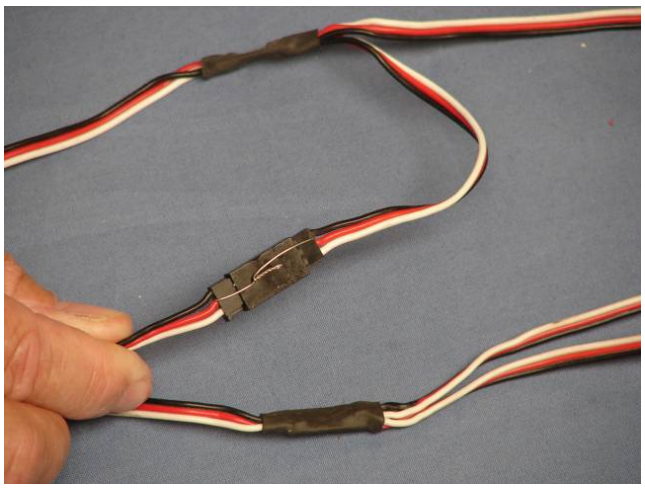
8. Pull Y harness through root end of wing.



9. Plug the male ends of the 24” and 36” extension into the female ends of one Y harness. Next plug the male end of this Y harness into the female end of the other Y harness.



10. Secure all Y harness connections with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension. Secure excess wire from Y harness and extensions inside the wing root rib using tape or Velcro as desired.



11. Install all three servos in servo wells with the output shaft toward the leading edge of the wing. Use a 1/16 bit to drill servo mounting holes.

12. Install servo with servo mounting screws.

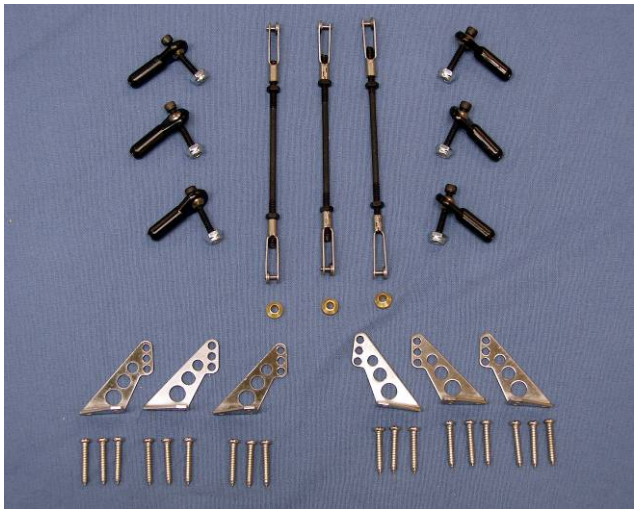
13. Repeat mounting steps for other servos so that all three aileron servos are mounted in bottom of wing as shown.

Note: Servo output shaft should face towards the wing leading edge. Servo arms should point towards the wing tip.

Aileron Control Linkage Installation

1. Gather the aileron control linkage parts as shown below. There are (3) 4-40 pushrods, (6) 4-40 ball link assemblies, (3) Flat washers ***(not Pictured)*** (3) brass spacers, (3) left and (3) right side control horns, and (18) wood screws for each wing panel.

Note: There is also included a **Carbon** tube for reinforcing the pushrod (***not pictured***). This will be installed during a later step.

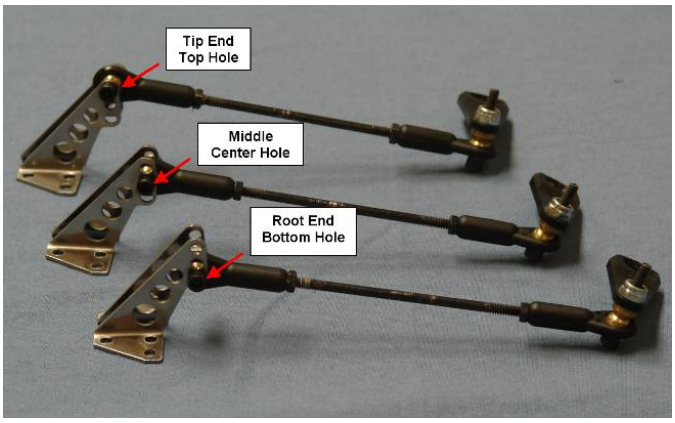


2. Assemble three pushrod and control horn assemblies as shown. The ball link goes between the left and right sides of the control horn sides and is secured with a nylon lock nut.

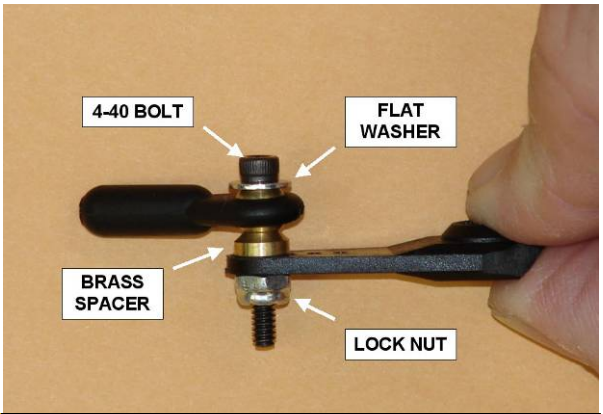
   IMPORTANT: The ball link for the root end control horn goes in the bottom hole of the horn. The ball link for the middle horn goes in the center hole of the horn. The ball link for the tip end horn goes in the top hole of the horn. This gives the correct offset to eliminate binding and twisting of the aileron.

Note: It will still be necessary to either program or use a after market type ***Match Box*** system to assure your servos will not bind or fight against each other.

Improperly installed servo linkages can cause servos to strip and ailerons to flutter. Aileron flutter can and will destroy your model instantly!



3. Correct installation of ball link, flat washer and brass spacer to servo arm shown below.

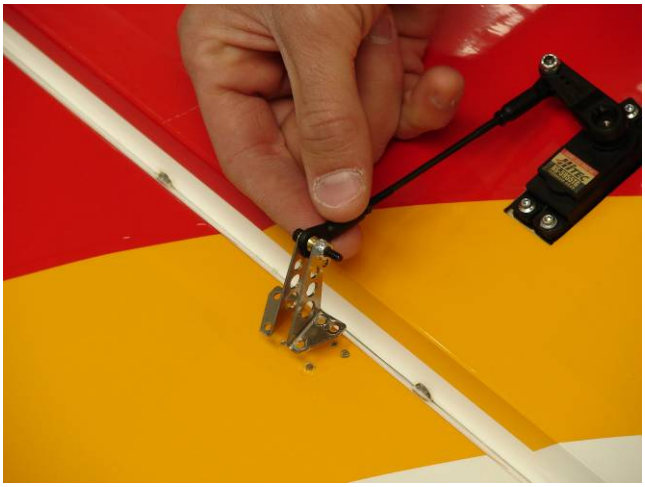


Note: Flat washer prevents ball link from coming off brass ball.

4. Install the servo arms facing toward the wing tip as shown.

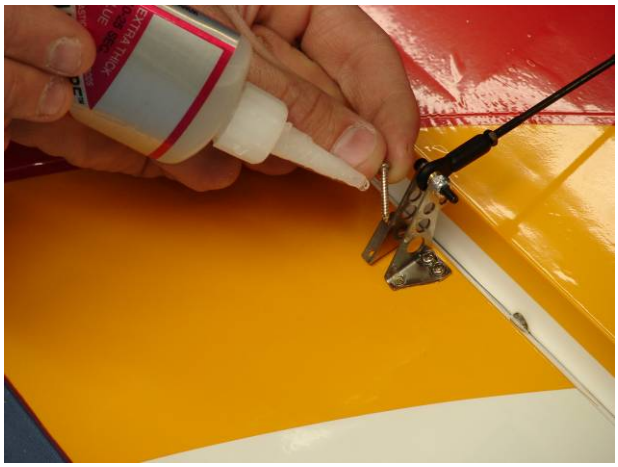
5. Align the control horns over the factory drilled holes.

Note: Control horns have been set at a slight offset to allow for maximum torque at full deflection



6. Use thick CA on each screw prior to installing to lock screws in place

Note: CA glues have a fast drying time. Remember to work quickly.

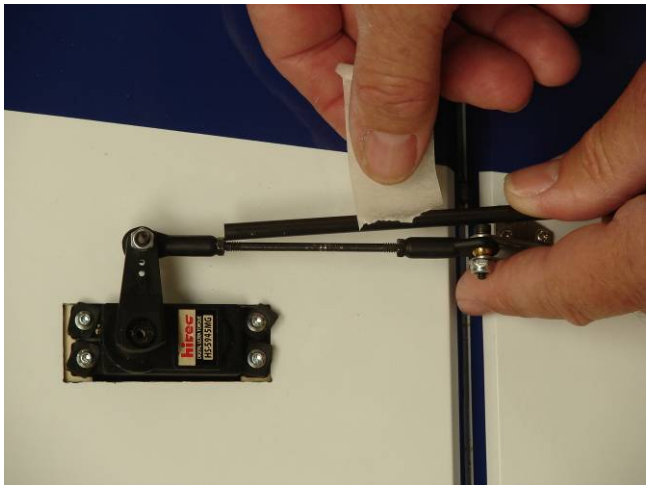


7. Align the left and right sides of the control horns to the mounting holes and secure using six wood screws as shown.

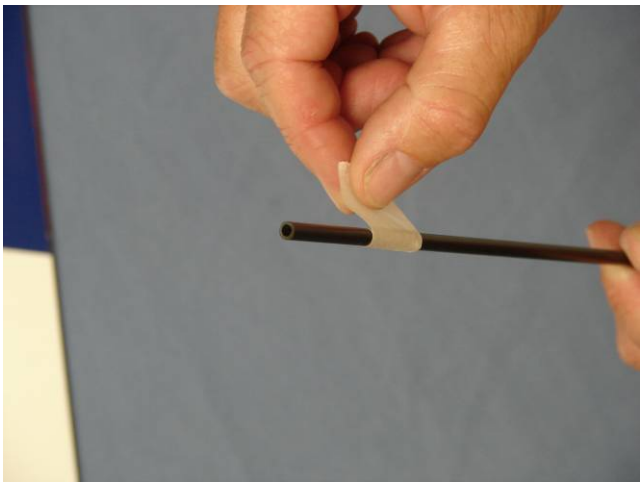
8. Plug the servos into the receiver and turn on. Ensure servos are centered and the servo arms are parallel to the aileron hinge line. Adjust the length of the pushrods so that the aileron is at the neutral position when the servo arms are parallel to the aileron hinge line. Ensure all servos do not fight each other at center or either end point at full deflection. Take advantage of servo programmers and match boxes available today to achieve best results. This will help keep servos from binding and causing possible aileron flutter.

Carbon Reinforcement Tube Installation

1. Gather the **supplied** carbon tube for reinforcing the aileron pushrods.

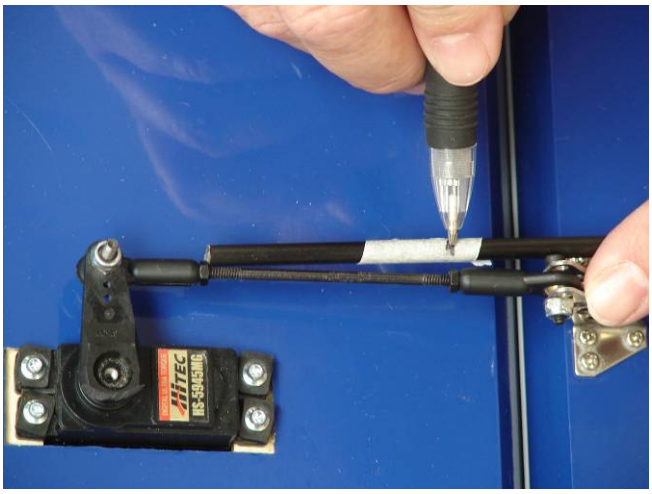


2. Wrap masking tape around carbon tube for marking the cut location.



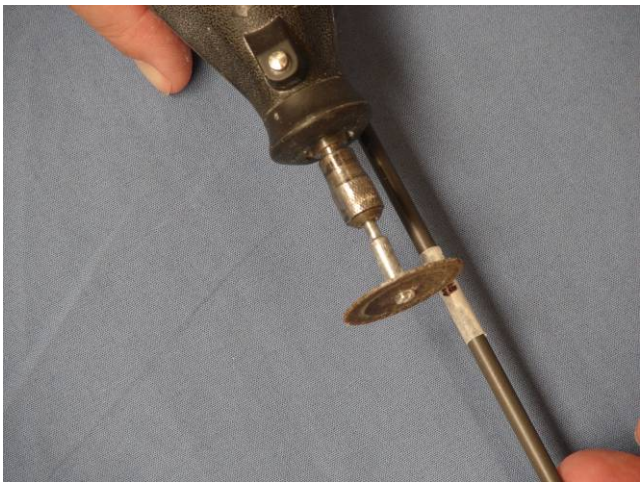
3. Mark cut location onto carbon tube. Carbon tube should fit between 4-40 ball link lock nuts.

Note: Make sure lock nuts are tight so pushrod length does not change.



4. Using a Dremel cut off wheel cut the carbon tube to correct length.

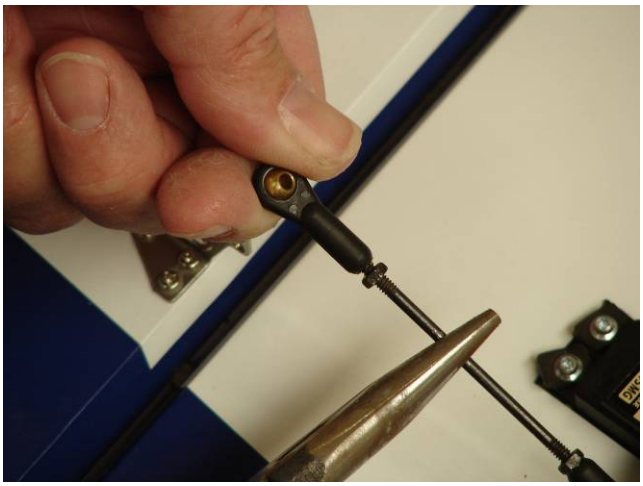
Note: Seal ends of carbon tube with thin CA to help prevent ends from splitting.



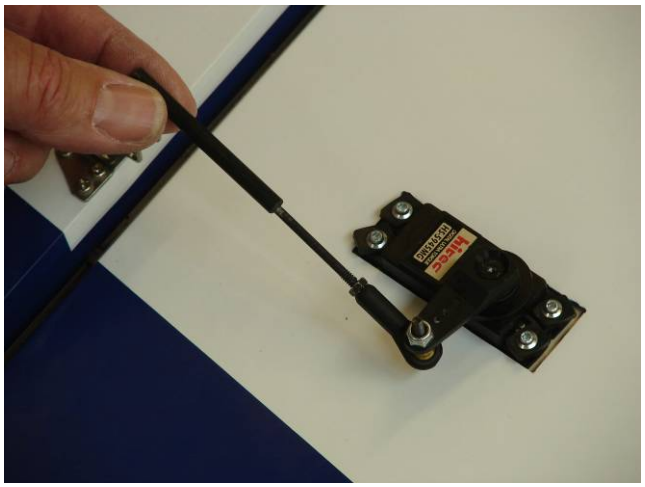
5. Remove the 4-40 ball link from the control horn.

6. Remove the 4-40 ball link and lock nut from the pushrod.

Note: Make sure lock nut against servo arm ball link is tight so pushrod length will not change.



7. Slide carbon reinforcing tube over the 4-40 pushrod and reassemble ball link to pushrod end.



8. Final pushrod assembly shown below.

9. Repeat all the above steps for installing the aileron servos into the other wing panel.

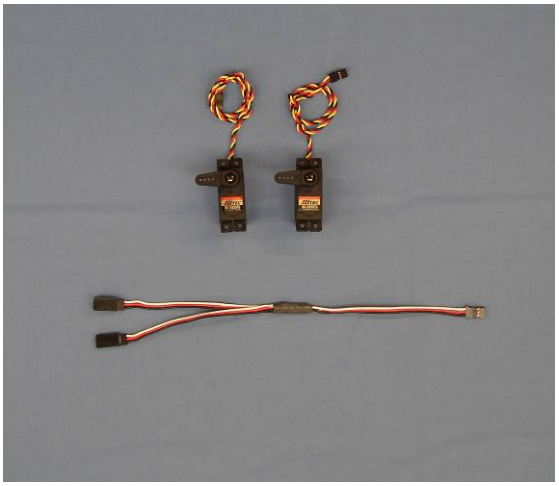
STAB AND ELEVATOR ASSEMBLY

Elevator Servo Installation

1. The elevators have been pre-hinged and **glued** to the stabs and are ready for flight. No other steps are necessary for hinging. Clear covering has been provided for sealing of the hinge gaps if desired.

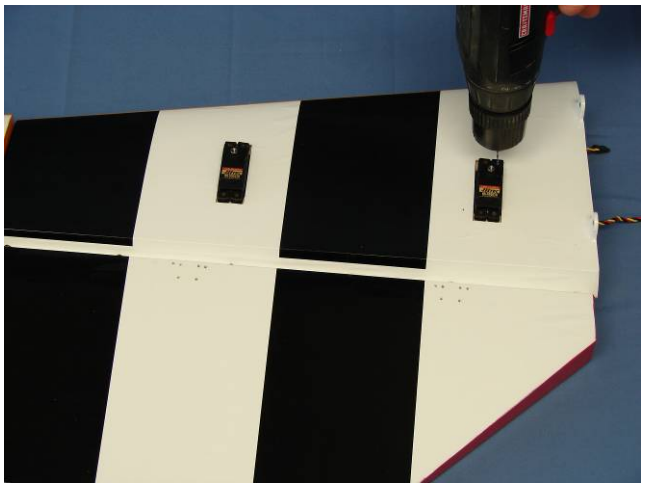
   Gather the stab and elevator, two elevator servos (2 per stab required), one 11" Y harness, one 48" and one 12" servo extension.

Note: 48" and 12" servo extension will be used to connect servos to receiver during a later step. You may also use one 60" extension.

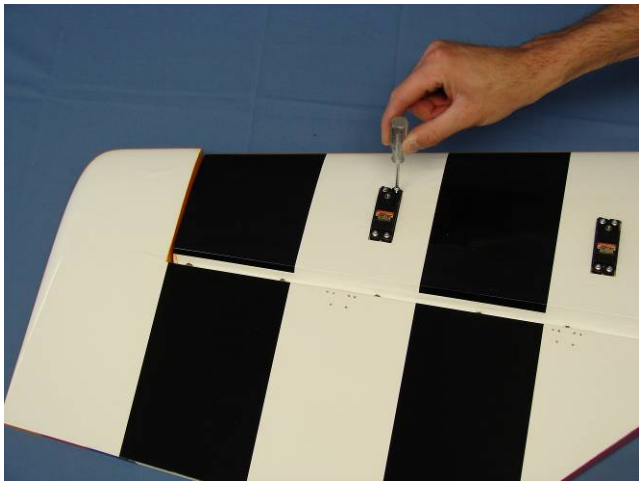


2. Install servos in servo wells with the output shaft toward the leading edge of the stab. Fish the servo leads through the stab and out of the stab root rib as shown.

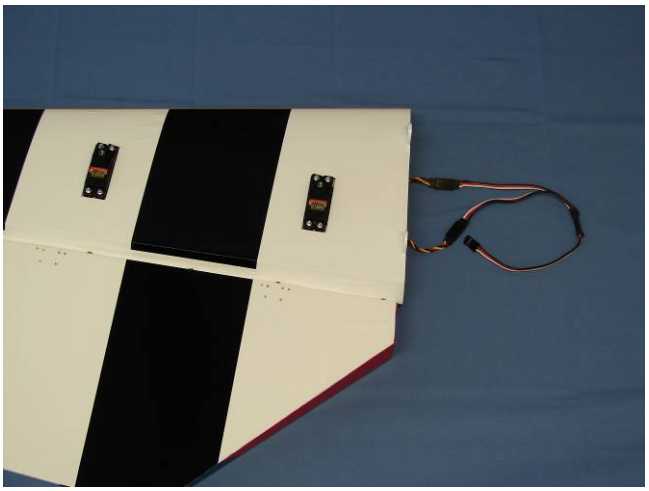
3. Mark locations of servo mounting holes. Use a 1/16 bit to drill servo mounting holes.



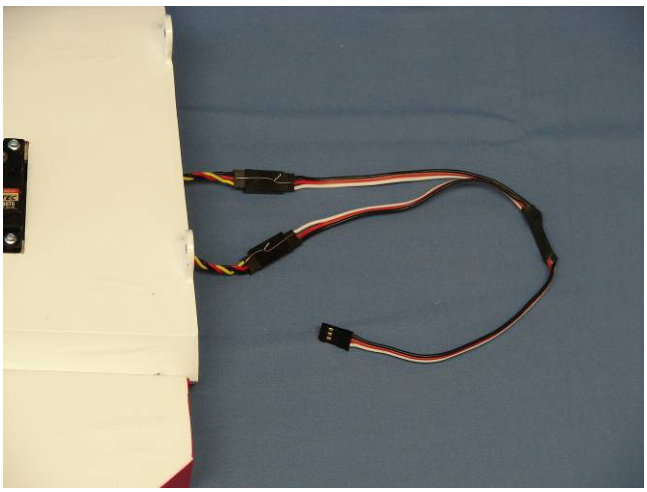
4. Install servos with servo mounting screws.



5. Plug the elevator servo leads into the female ends of the 11” Y harness as shown.

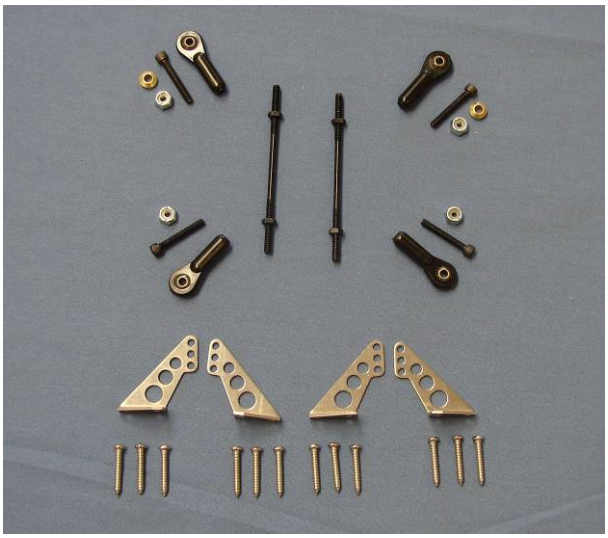


6. Secure the servo connectors with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension. Secure excess wire from Y harness and extensions inside the stab root rib using tape or Velcro as desired.

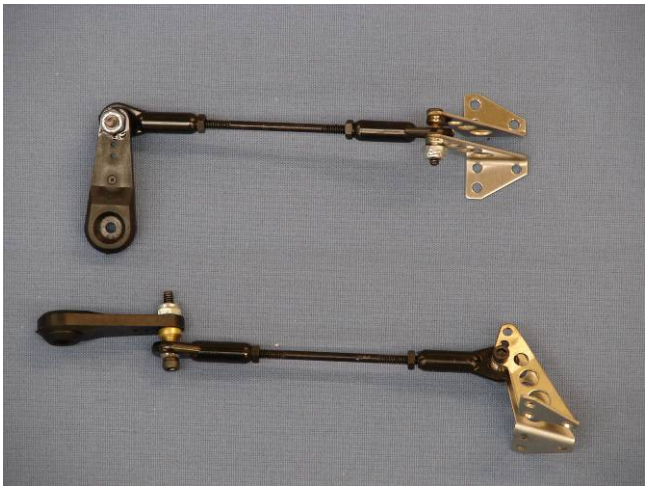


7. Gather the elevator control linkage parts as shown below. There are (2) pushrods, (4) 4-40 ball link assemblies, (2) flat washers ***(not pictured)*** (2) brass spacers, (2) left and (2) right side control horns, and (12) wood screws per stab and elevator.

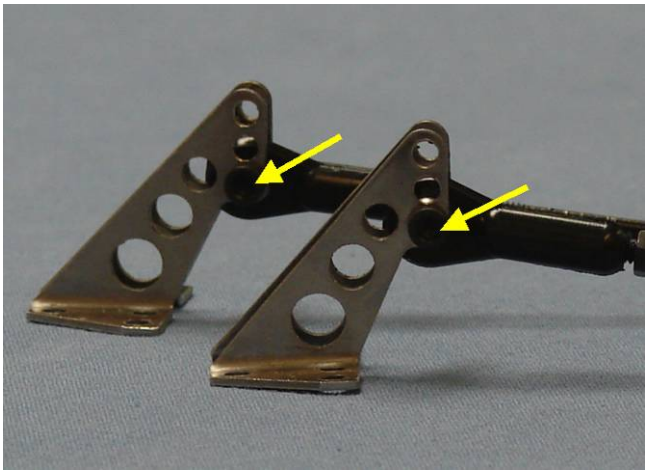
Note: There is also a **Carbon** tube for reinforcing the pushrod (***not pictured***). This will be installed during a later step.



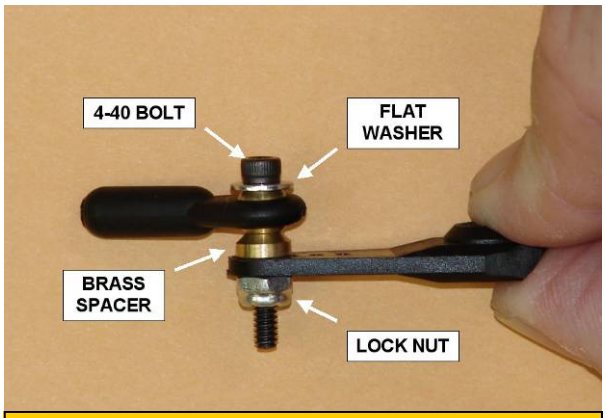
8. Assemble two pushrod and control horn assemblies as shown. The ball link goes between the left and right sides of the control horn sides and is secured with a nylon lock nut.



9. You may mount the ball links into any of the three control horn holes. **However, it is very important that you use the same hole for each control horn.** We recommend you use the middle or bottom hole to achieve desired 3D throws and top hole if you prefer more precision or I.M.A.C. style flying.



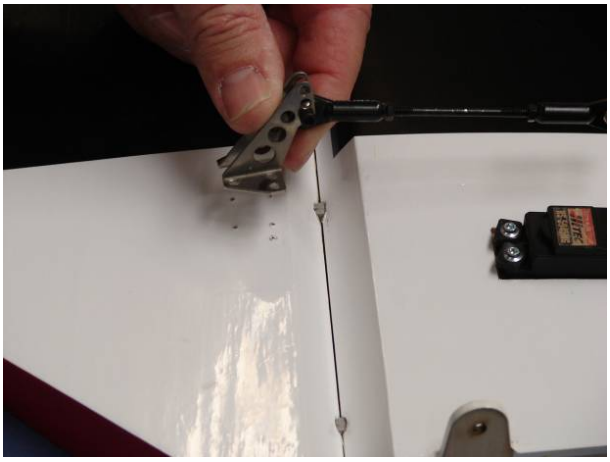
10. Correct installation of ball link, flat washer and brass spacer to servo arm shown below.



Note: Flat washer prevents ball link from coming off brass ball.

11. Align the control horns over the factory drilled holes.

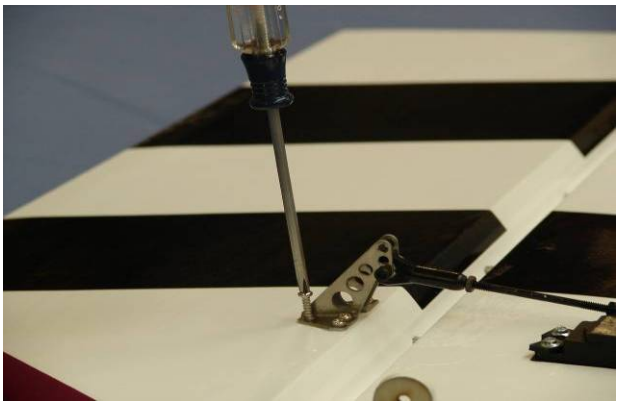
Note: Control horns have been set at a slight offset to allow for maximum torque at full deflection



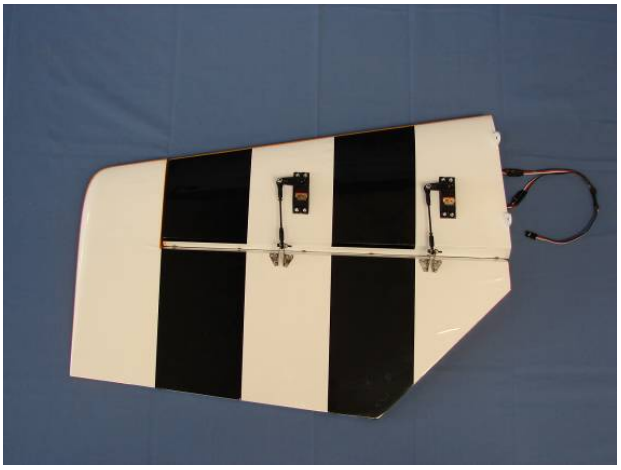
12. Use thick CA on each screw prior to installing to lock screws in place

Note: CA glues have a fast drying time. Remember to work quickly.

13. Mount control horn using six wood screws as shown.



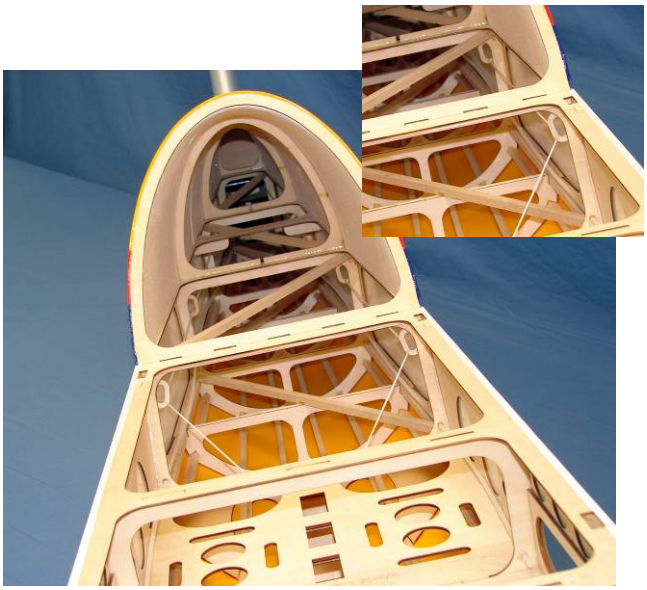
14. Completed stab and elevator shown. Repeat steps for other stab and elevator.



15. Plug the Y harness into the female end of the 48” extension and plug the 12” extension into the 48” extension to make extension long enough to reach to the radio floor of the fuselage. Secure the servo connectors with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension.

Note: You may also use one 60” extension. ***Recommended***

16. Use the provided draw strings in fuselage and pull elevator extension wires through the wire holders in the fuse.

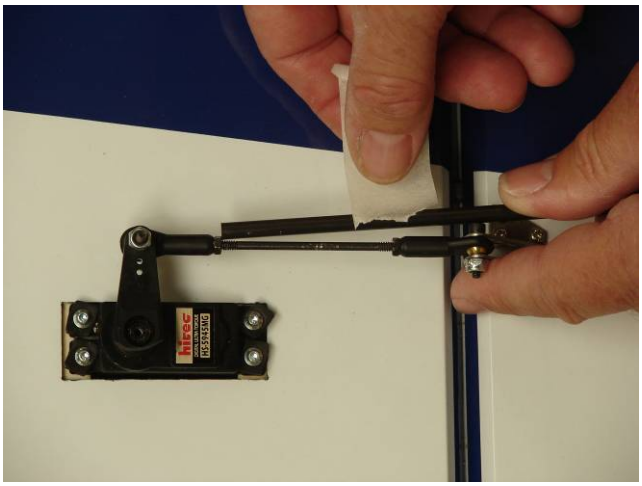


17. Plug the elevator servo extension into the receiver and turn on. Ensure each servo is centered and the servo arm is parallel to the elevator hinge line. Adjust the length of the pushrods so that the elevator is in the neutral position when the servo arm is parallel to the elevator hinge line. A 1 1/2” servo arm is recommended to achieve full deflection of the elevator bevel.

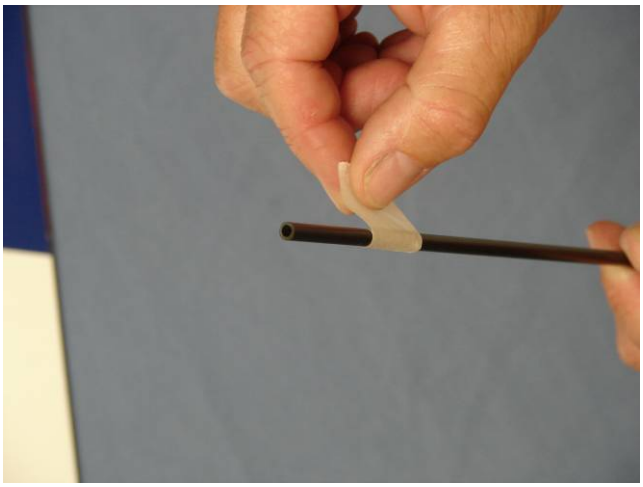
18. Ensure the servos do not bind at center or either end point at full deflection. Take advantage of servo programmers and match boxes available today to achieve best results. This will help keep servos from binding and causing possible elevator flutter.

Carbon Reinforcement Tube Installation

1. Gather the **supplied** carbon tube for reinforcing the elevator pushrods.

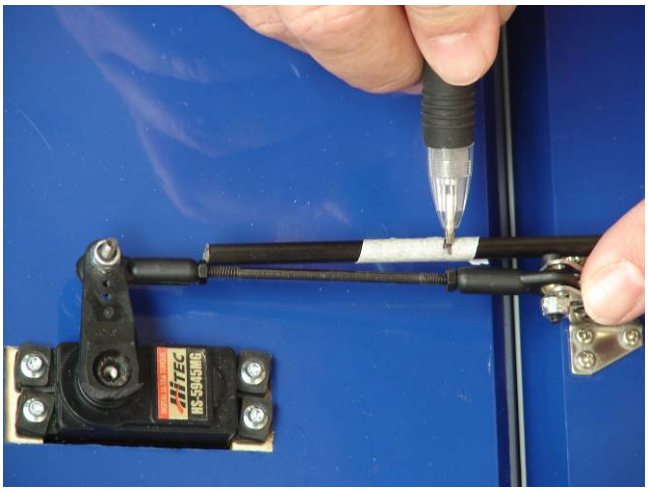


2. Wrap masking tape around carbon tube for marking the cut location.



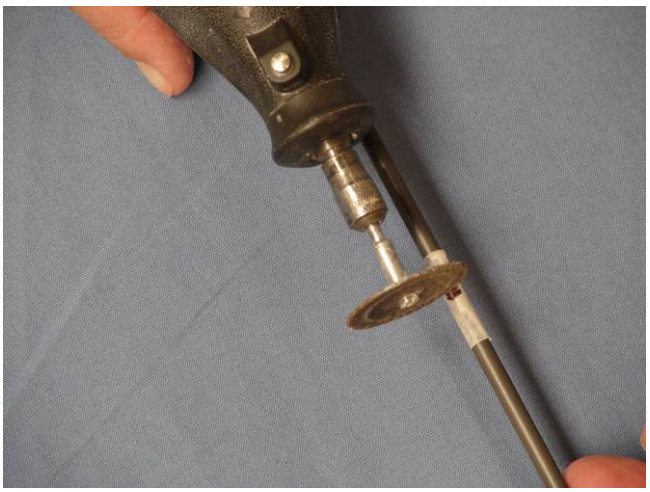
3. Mark cut location onto carbon tube. Carbon tube should fit between 4-40 ball link lock nuts.

Note: Make sure lock nuts are tight so pushrod length does not change.



4. Using a Dremel cut off wheel cut the carbon tube to correct length.

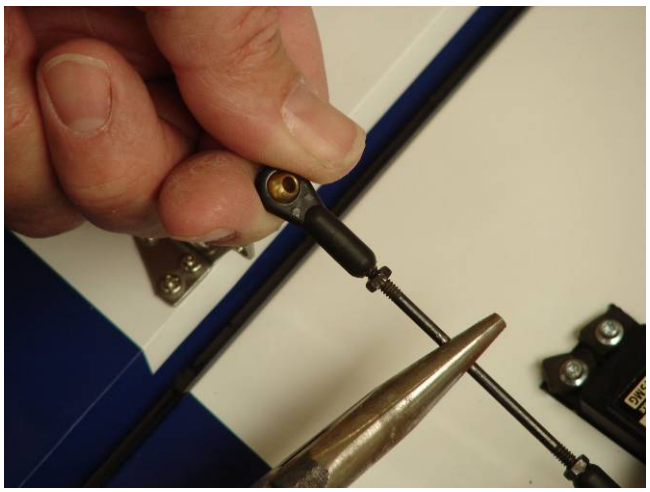
Note: Seal ends of carbon tube with thin CA to help prevent ends from splitting.



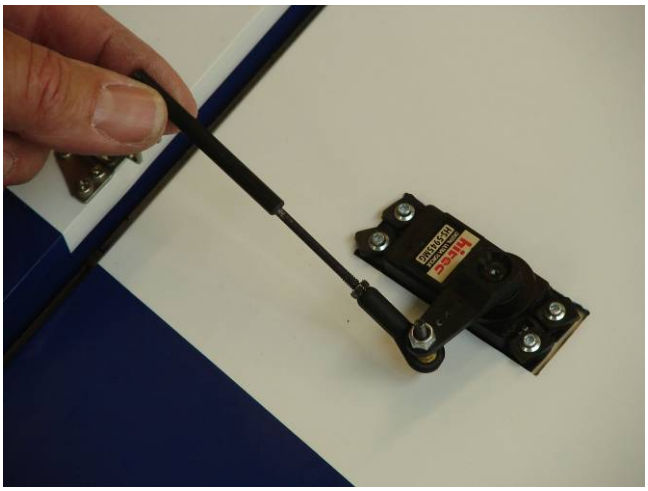
5. Remove the 4-40 ball link from the control horn.

6. Remove the 4-40 ball link and lock nut from the pushrod.

Note: Make sure lock nut against servo arm ball link is tight so pushrod length will not change.



7. Slide carbon reinforcing tube over the 4-40 push-rod and reassemble ball link to pushrod end.



8. Final pushrod assembly shown below.

9. Repeat all the above steps for installing the elevator servos into the other stab.

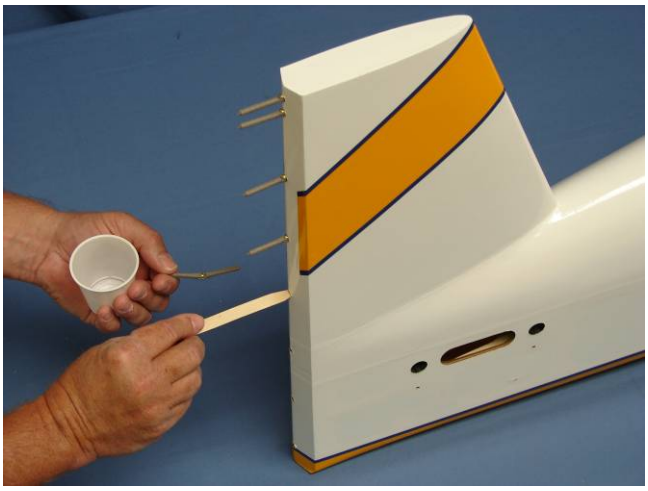
RUDDER AND RUDDER SERVOS INSTALLATION

Rudder Installation

1. Gather the rudder, hinges, epoxy, Vaseline, stir sticks, mixing cup and alcohol as shown. Use 15-30 minute epoxy to ensure adequate working and cleanup time.

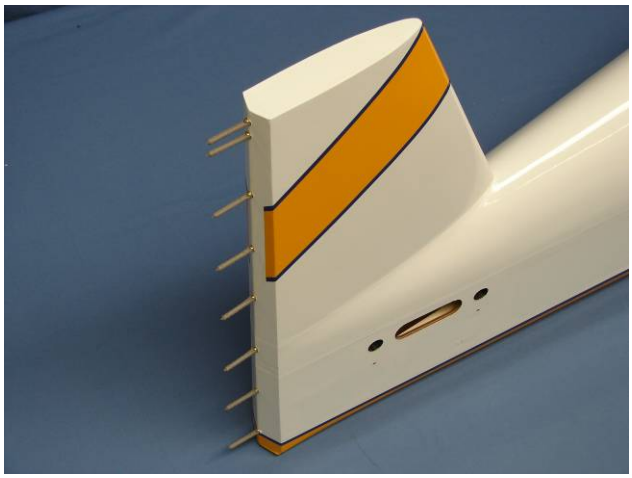
2. Prep all hinges for installation by applying Vaseline petroleum jelly or light oil to the hinge joint. This ensures no epoxy gets into the hinge during assembly.

3. Mix epoxy in mixing cup and use a tapered stick to apply the epoxy inside the pre-drilled holes in the trailing edge of the fin. Apply epoxy to one side of each hinge and insert the hinge completely into the hole.

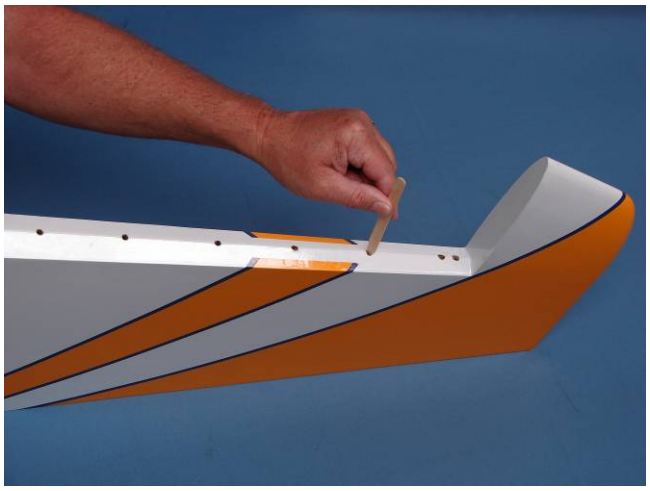


4. Ensure the hinge axis is vertical and parallel to the trailing edge of the fin before epoxy cures. Wipe away excess epoxy with alcohol wetted wipes. Epoxy the hinges into the fin first and allow epoxy to fully cure.

Note: Ensure you have free and full travel of each hinge.



5. Mix epoxy in mixing cup and use a tapered stick to apply the epoxy inside the pre-drilled holes in the leading edge of the rudder. Apply epoxy onto each hinge.



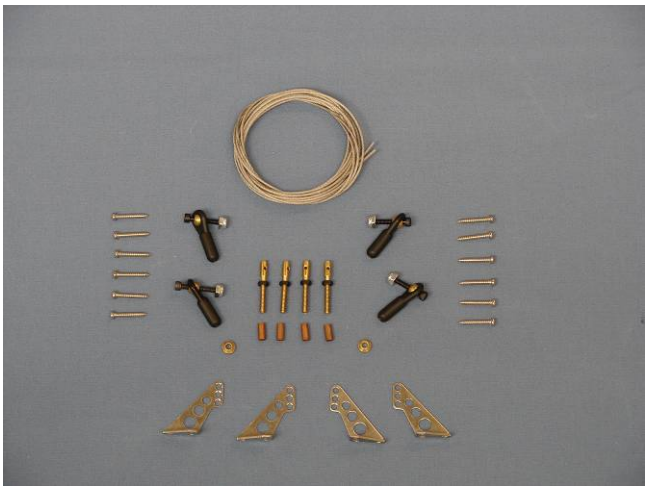
6. Carefully slide the rudder onto each hinge and against the trailing edge of the fin. Wipe away excess epoxy with alcohol wetted wipes.

7. Ensure there is minimal to no gap between fin and rudder. Allow epoxy to fully cure.

Note: Ensure you have full rudder deflection before epoxy fully cures.

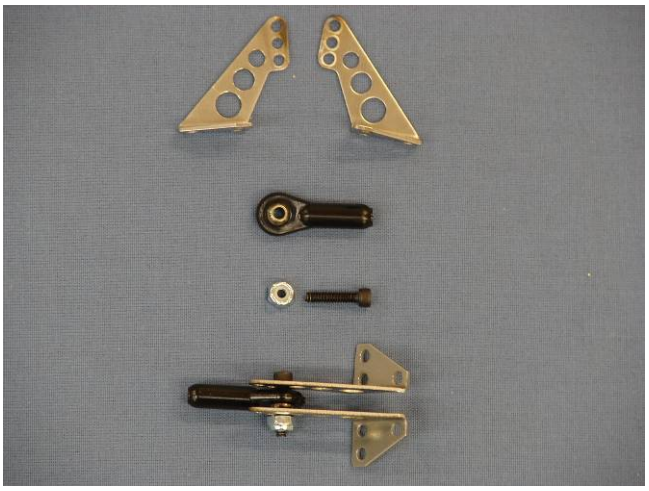
Rudder Horns, Servos and Pull-Pull Cable Installation

1. Gather the rudder control linkage parts shown below. (2) Rudder cables, (4) 4-40 ball links with hardware, (2) Flat washers ***(not pictured)*** (2) brass spacers, (4) threaded couplers, (4) brass swaging tubes, (2) left and (2) right control horns (12) wood screws.

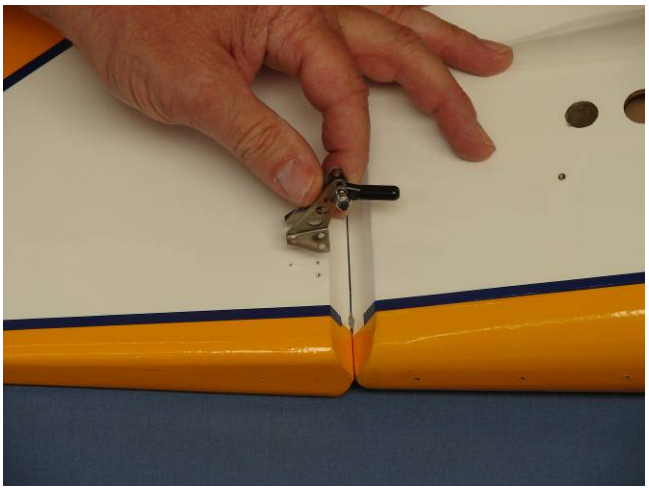


2. Assemble the ball links between the control horns as shown. Secure with nylon lock nut.

Note: Mount ball link to bottom control horn hole to obtain full rudder deflection



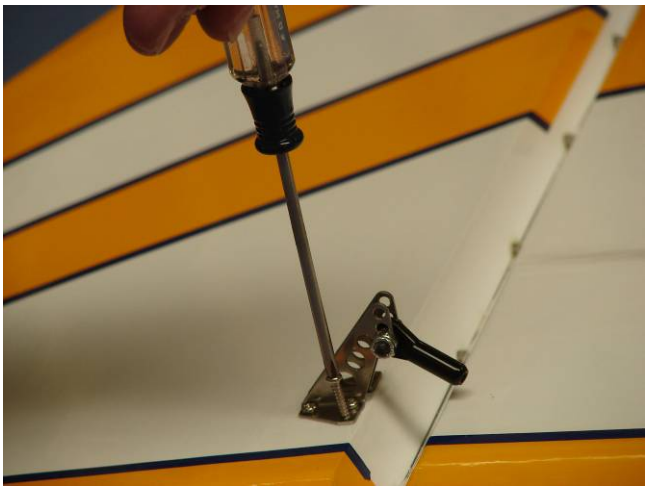
3. Align the control horns over the factory drilled holes.



4. Use thick CA on each screw prior to installing to lock screws in place

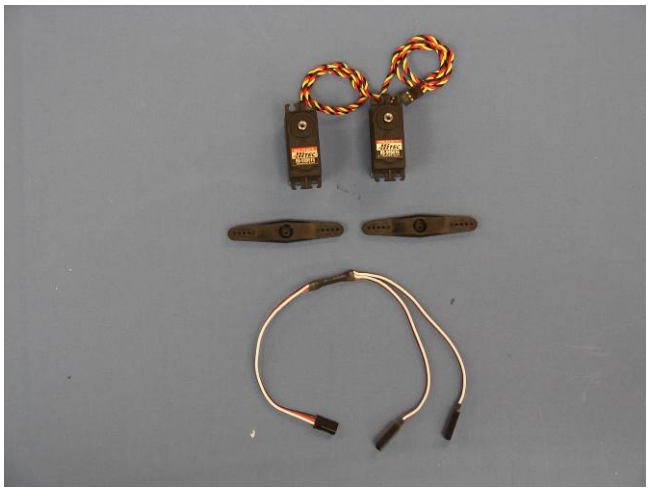
Note: CA glues have a fast drying time. Remember to work quickly.

5. Align the left and right sides of the control horns to the mounting holes and mount using six wood screws as shown.



6. Gather the rudder servos (min 180 in./oz.) 3” to 3 1/2” Double out put servo arms and a 11” Y harness as shown below.

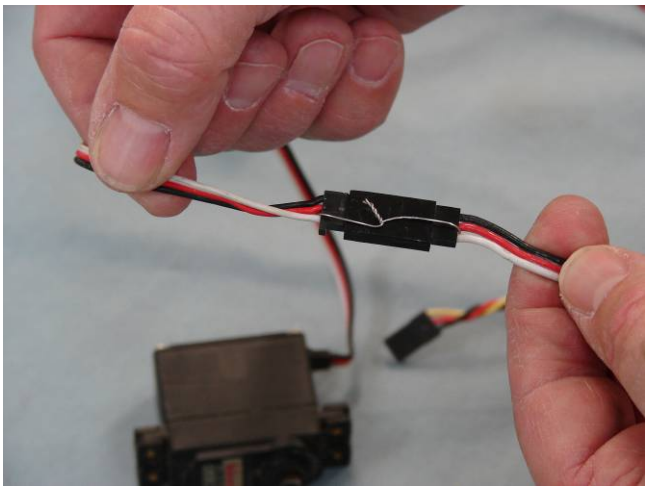
Note: If using higher Torque (**min 300 in./oz**.) Digital, Metal Geared servo, only two servos are required. This is the installation we will use. If three servos are used, installation process will be similar.



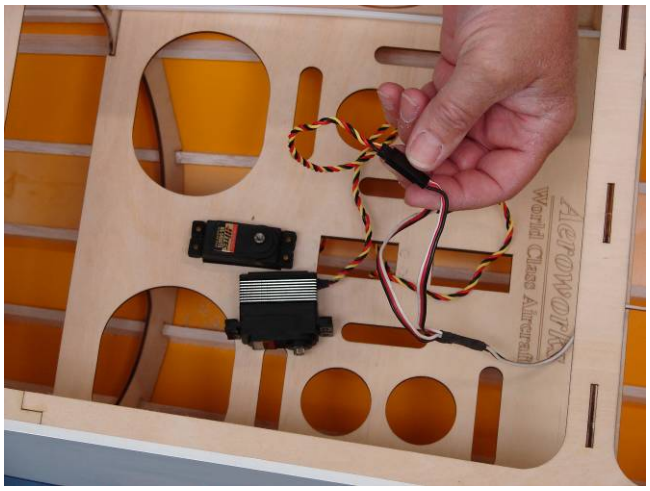
7. Remove wood screws from the fuselage removable radio floor.

8. Remove radio floor from fuselage.

9. Attach the Y harness to aft rudder servo lead and secure with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension.



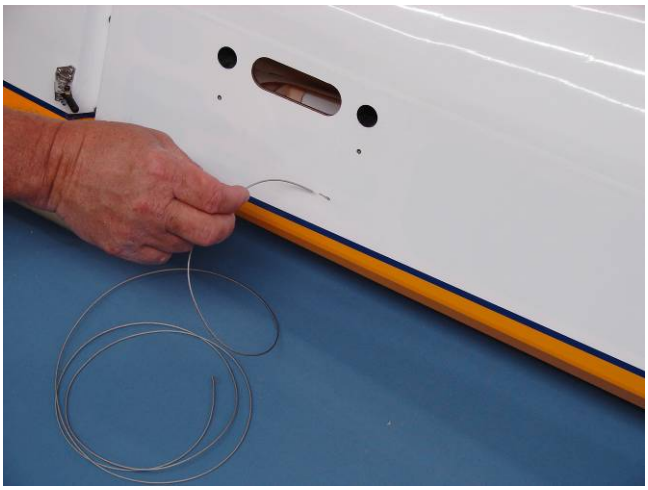
10. Install the aft rudder servo with the output shaft forward. Pull the servo lead and Y harness up through the forward servo cutout. Attach the Y harness to the forward rudder servo lead and secure with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension. Push the servo leads and Y harness back through the forward servo cutout.



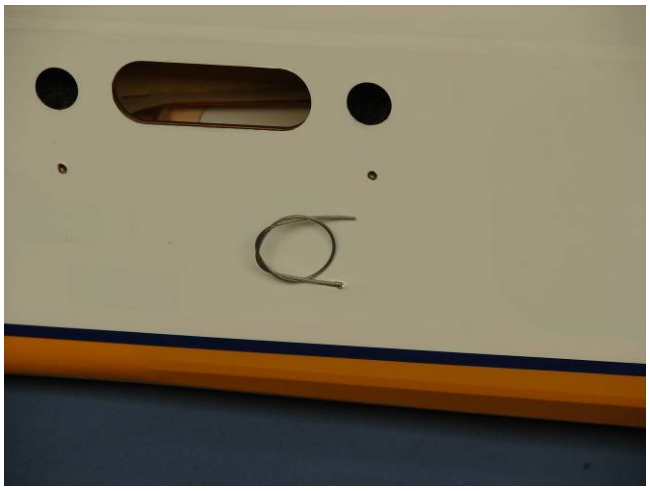
11. Install the forward rudder servo with the output shaft forward. Mark and use a 1/16 bit to drill the rudder servo mounting holes.

12. Install rudder servos with servo mounting screws.

13. Feed the rudder cable through the pre installed cable exit tube in the tail of the fuse toward the front. Repeat for other side.

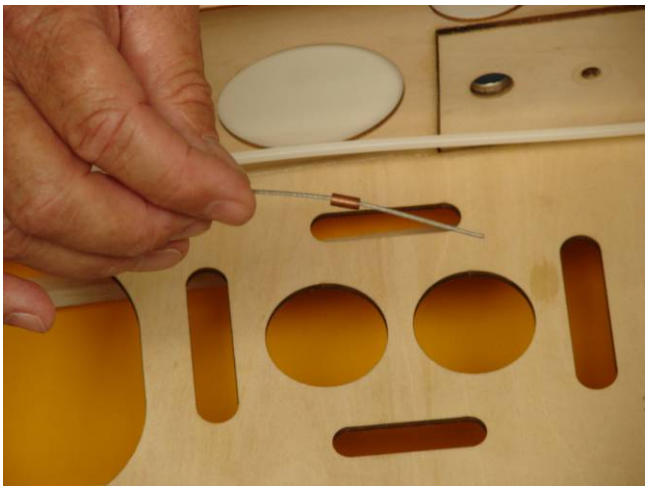


14. Tie off or tape rudder cables to keep them from pulling into fuse.

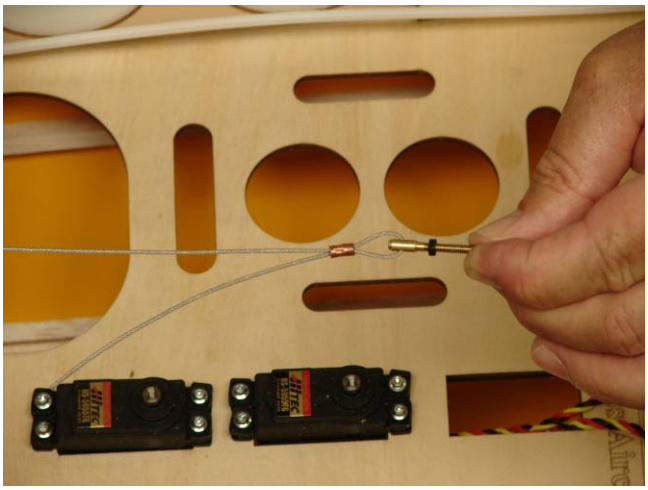


15. Pull the rudder cables from the fuse tail to the rudder servo tray.

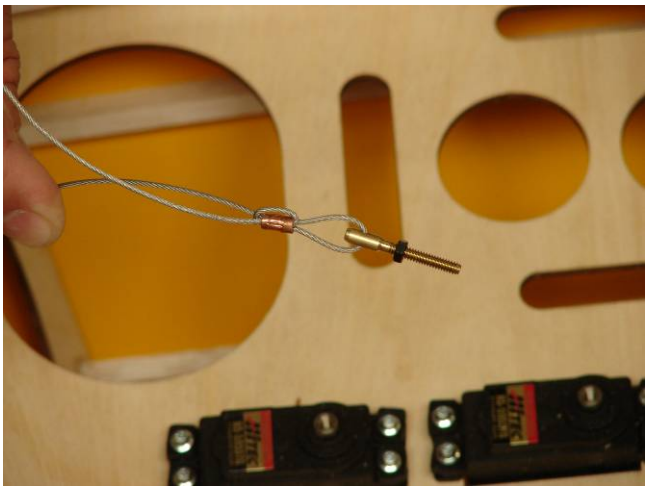
16. Insert rudder cable through the brass swage tube as shown.



17. Thread cable through the threaded coupler hole, and back through the brass swage tube as shown.

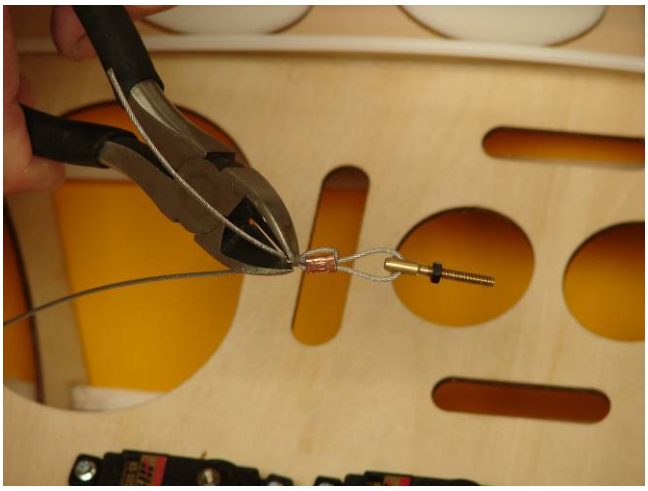


18. Loop the cable back through the brass swage tube and pull tight as shown.

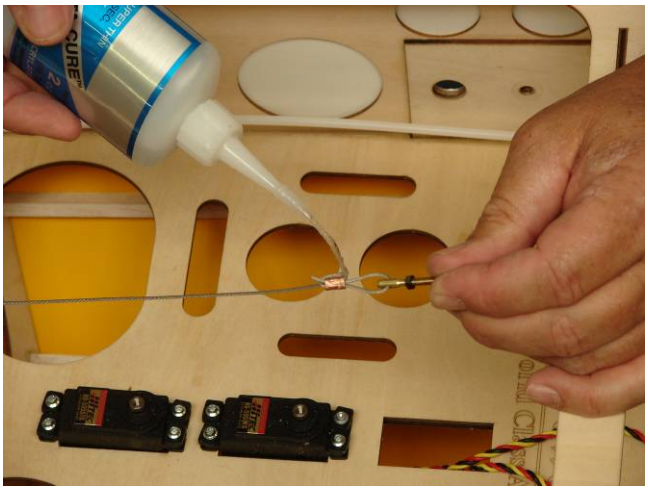


19. Crimp the brass tube with a crimping tool or pliers.

20. Cut off excess cable as shown.

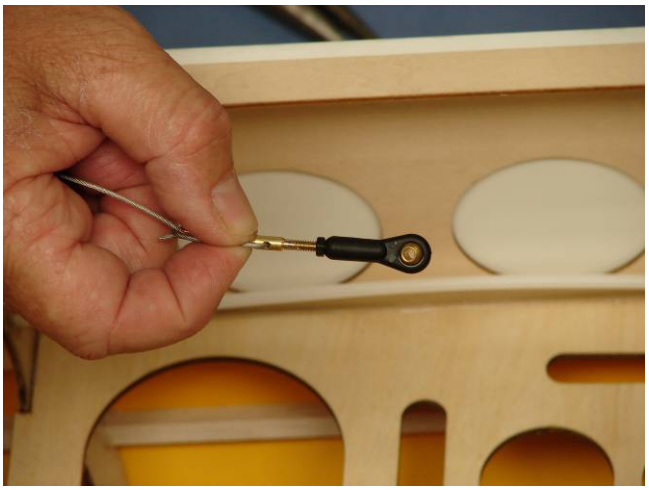


21. A drop of thin CA may be applied to the swage tube to help secure the cable.

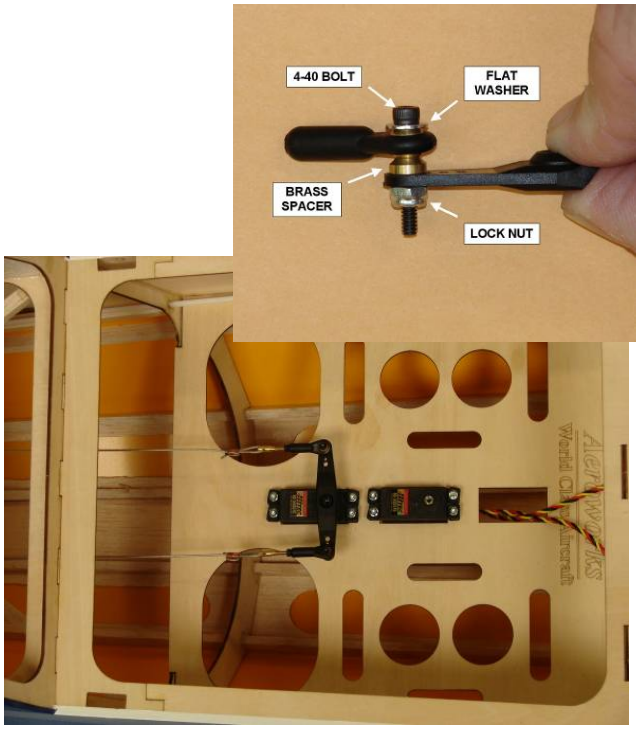


22. Thread a 4-40 ball link half way onto the threaded coupler.

23. Repeat above steps for the other side rudder cable.

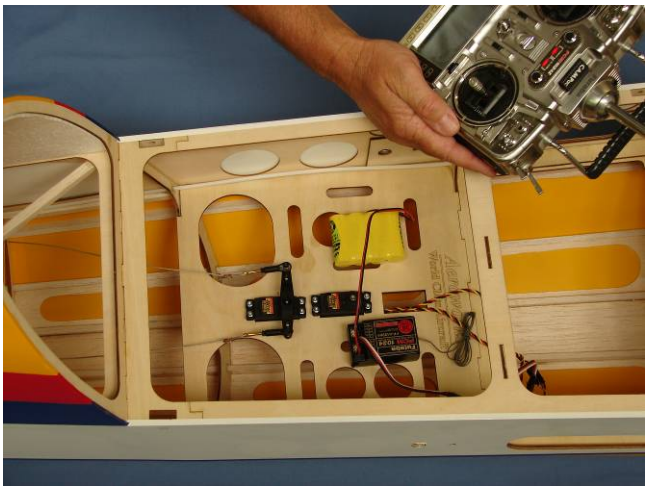


24. Attach the ball links to the aft rudder servo arm using the supplied brass spacers, 4-40 bolts, flat washers and locknuts.



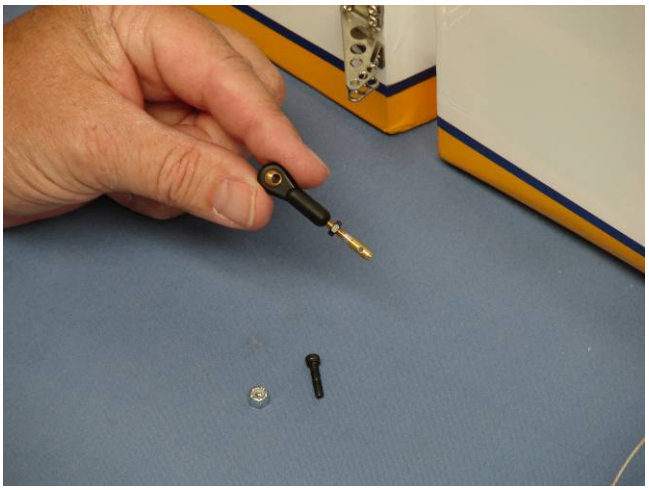
25. Tape the rudder balance tab to the top leading edge of the vertical fin in the neutral position as shown. This ensures the rudder is straight when the cables are attached.

26. Plug the rudder servo Y harness into the rudder channel of the receiver and power up. Turn on transmitter to center rudder servos.



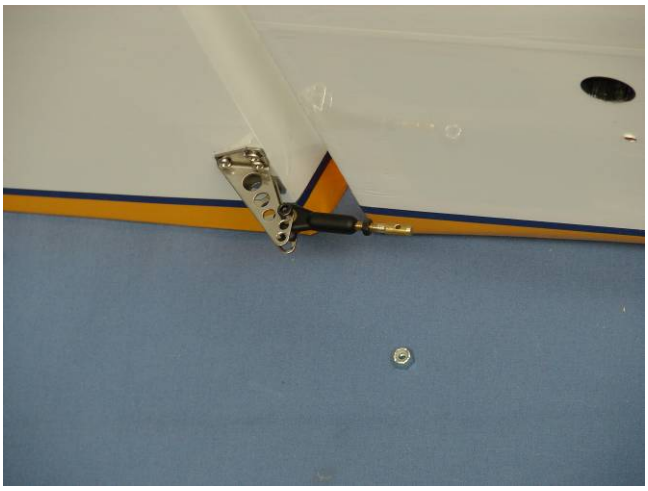
27. Remove ball link from rudder control horn

28. Screw threaded coupler halfway into ball link

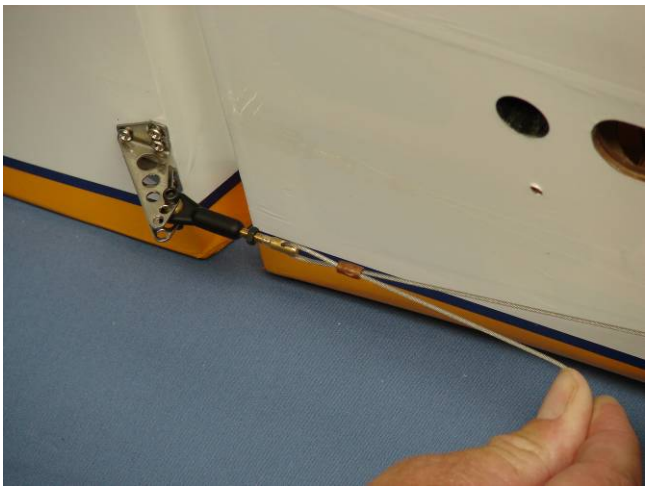


29. Reinstall the ball link onto the rudder control horn.

Note: Do not secure with lock nut at this time. This will make final adjustment of cables easier shown during a later step.



30. Slide brass swage onto rudder cable. Next, thread the rudder cable through the threaded coupler, and back through the brass swage tube. With the rudder servos powered up and centered, pull light tension on the cable through the coupler on both sides as shown.

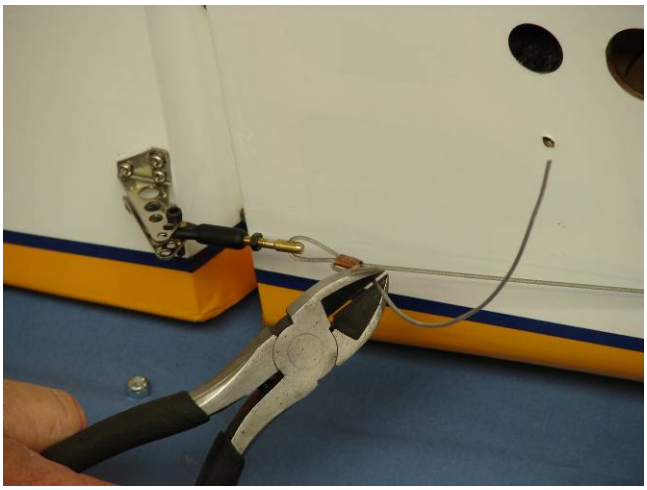


31. Loop the cable back through the brass swage tube as shown.

32. Pull cable until tight.

33. Crimp the brass tube with a crimping tool or pliers.

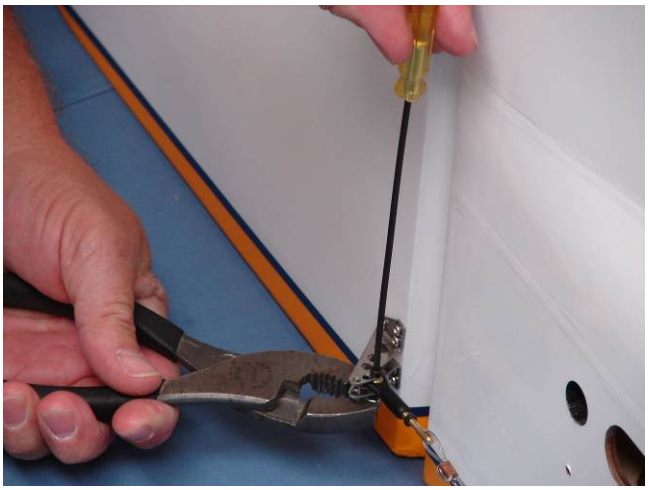
34. Cut off excess cable as shown.



35. A drop of thin CA may be applied to the swage tube to help secure the cable.

Repeat above steps for opposite side rudder cable.

36. After final adjustment of cables is complete secure ball links with 4-40 lock nut.

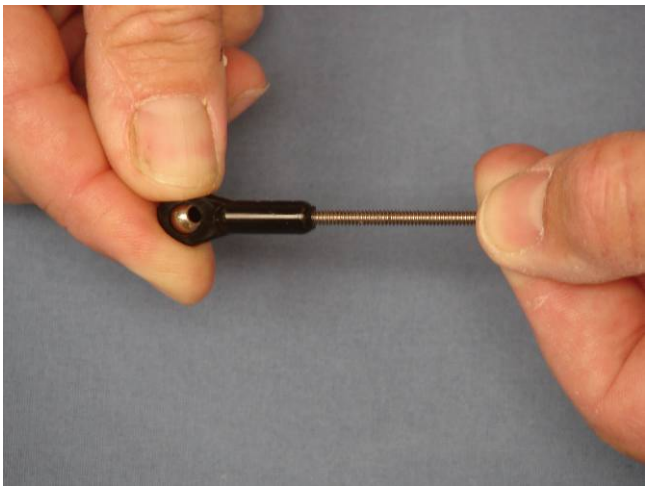


Rudder Servo Arm Coupler

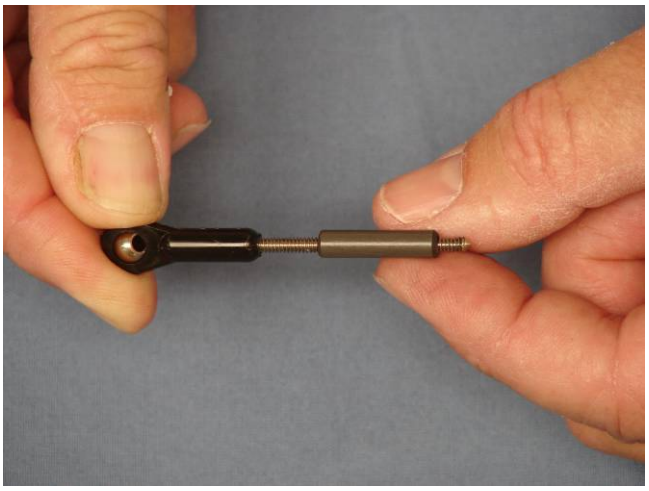
1. Gather the rudder servo arm coupler hardware as shown below. There are (4) 4-40 ball links with hardware, (2) 4-40 all thread rods, (4) Brass spacers and (2) carbon sleeves

Note: Rudder coupler hardware is ***Not Supplied***.

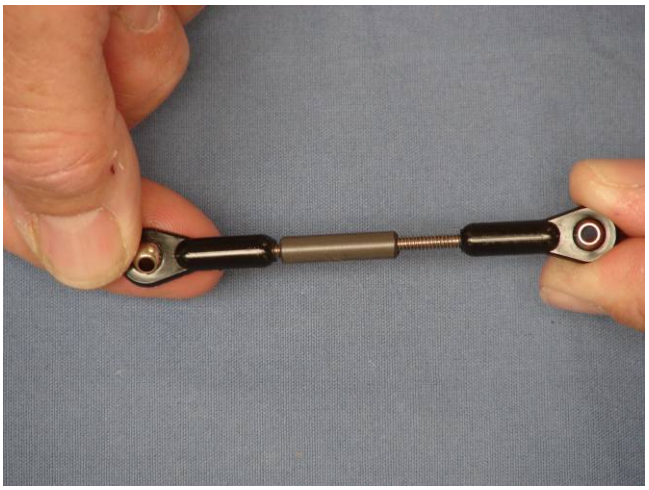
2. Thread the threaded rod half way into the ball link as shown.



3. Slide the carbon sleeve over the threaded rod as shown.



4. Screw the remaining ball link onto the threaded rod as shown. Repeat above steps for the other rudder arm coupler rod.



5. Attach the two rudder coupler rods to both rudder servo double output arms using the 4-40 ball links, spacers and bolts as shown. Secure bolts with lock nuts.

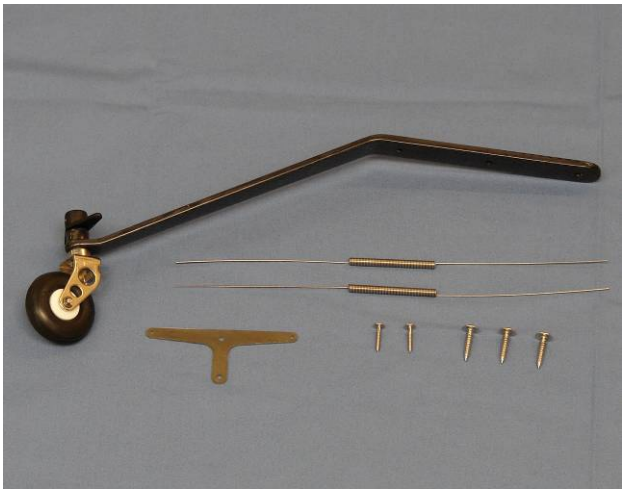
Note: You will want to use a minimum of 3" to 3 1/2" servo arms

6. Install the rudder servo output arms on the rudder servos as shown. Adjust the length of the rudder coupler rods so that the rudder output arms are at the centered position. Ensure both servos do not fight each other at center or either end point at full deflection.

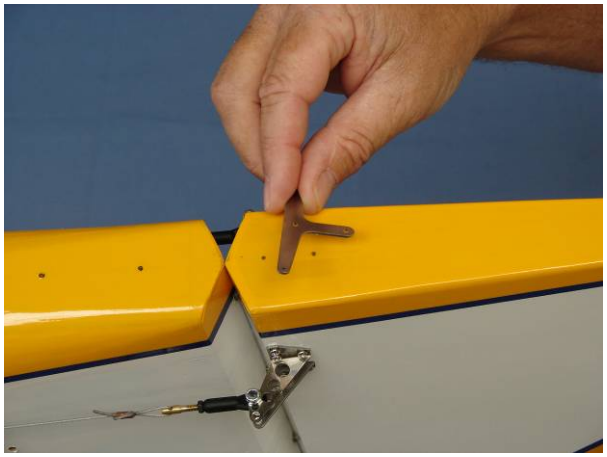
Tail Wheel Installation

1. Tape the rudder balance tab to the top leading edge of the vertical fin in the neutral position as shown. This ensures the rudder is straight when the tail wheel steering springs are installed.

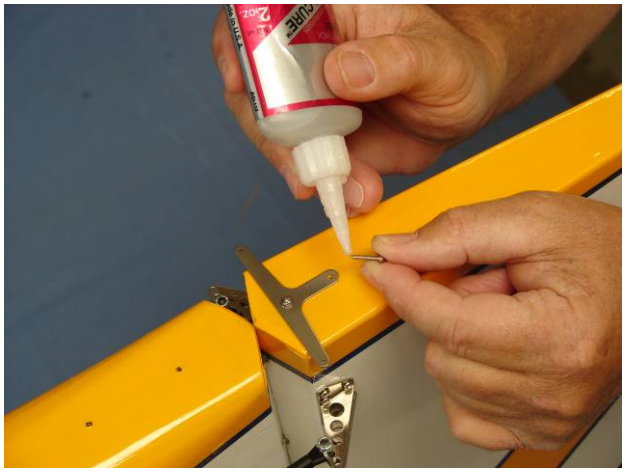
2. Gather the tail wheel parts shown below. (1) carbon Tail wheel strut, (3) tail wheel mounting screws, (1) aluminum steering tiller, (2) tiller mounting screws, and (2) steering springs.



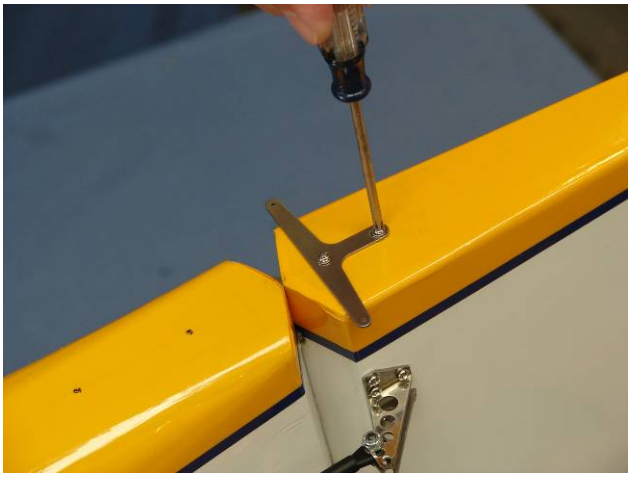
3. Place tail wheel steering tiller over the pre-drilled holes in the bottom of the rudder.



4. Apply a drop of thick CA to the mounting screws before inserting into the tiller mounting holes.



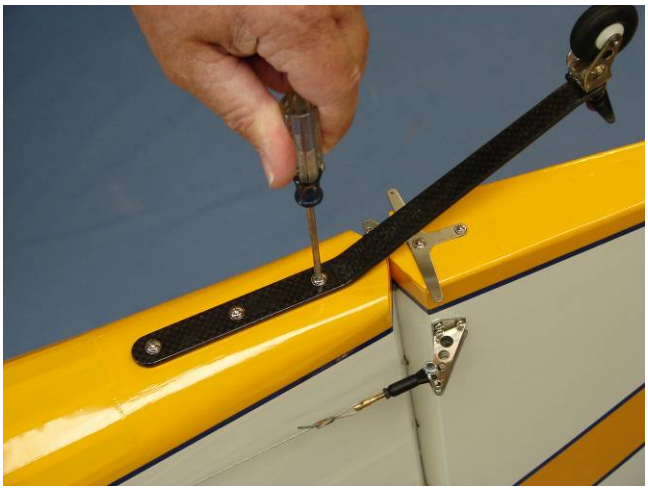
5. Mount the tail wheel steering tiller using two wood screws.



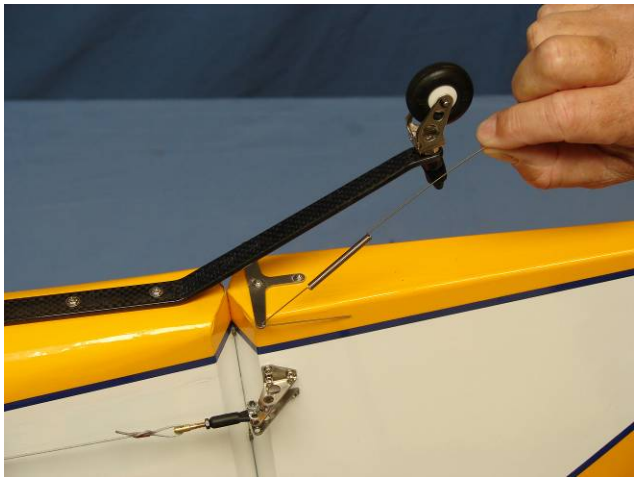
6. Place tail wheel strut over the pre-drilled holes in the bottom rear of the fuse.

7. Place a drop of thick CA on tail wheel strut mounting screws before inserting in the pre-drilled mounting holes on the bottom rear of the fuse.

8. Mount the tail wheel strut using three wood screws.



9. Attach the steering spring to one side of the rudder tiller. Center the spring between the rudder and tail wheel tillers.

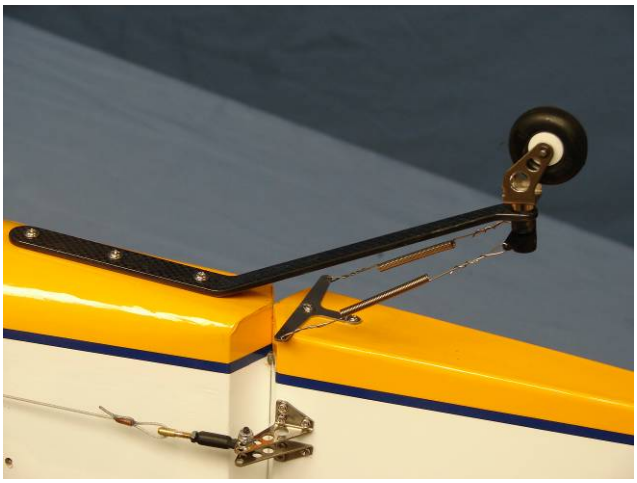


10. Use pliers to twist spring ends closed around the rudder tiller.

11. Use pliers to twist spring ends closed around the tail wheel tiller. Cut off excess spring wire as shown.

12. Repeat for opposite side tail wheel spring. Adjust length and spring tension so that tail wheel is centered when rudder is centered.

13. Tail wheel final assembly is complete.

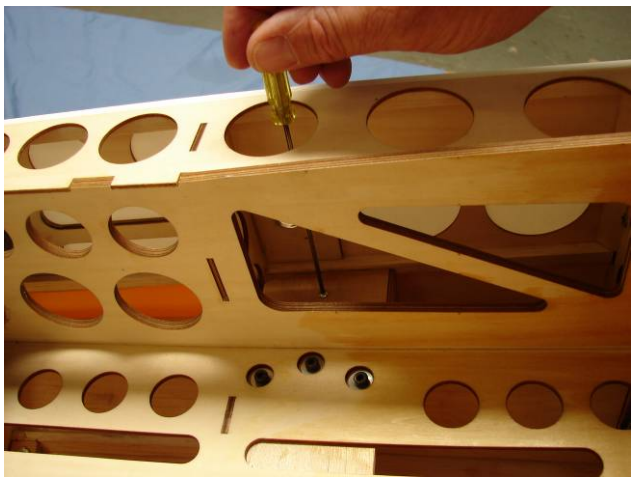


MAIN LANDING GEAR AND WHEEL PANT INSTALLATION

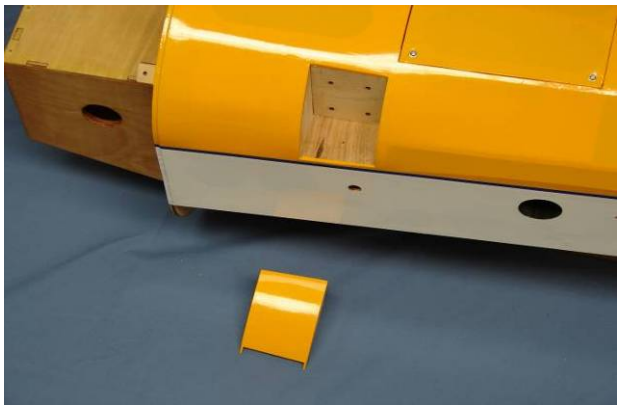
Main Landing Gear Installation

1. Gather the landing gear parts as shown below. (2) landing gear struts, (2) wheels, (2) axle assemblies, (4) wheel collars, (2) wheel pants and landing gear mounting hardware.

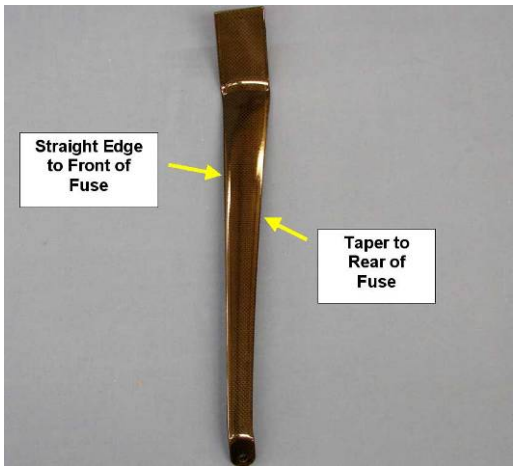
2. Remove 4-40 gear cover bolt from inside fuse.



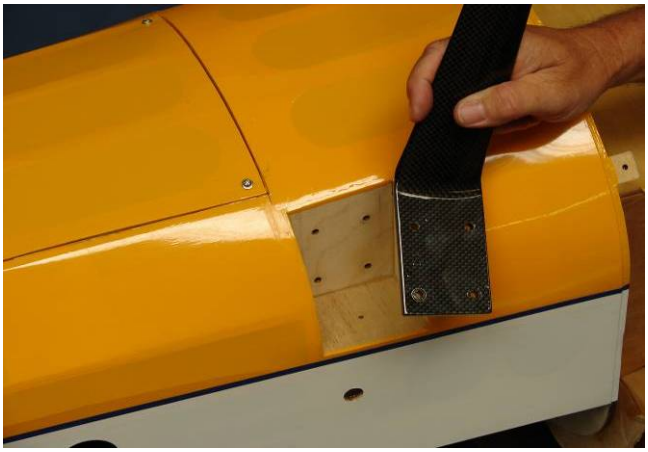
3. Gear cover removed shown below. Repeat for opposite side gear cover.



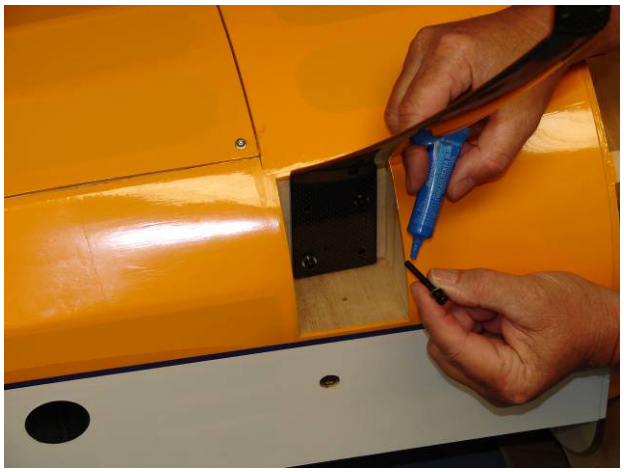
4. Note that the trailing edge of the landing gear strut is tapered. The tapered edge goes toward the rear of the fuse.



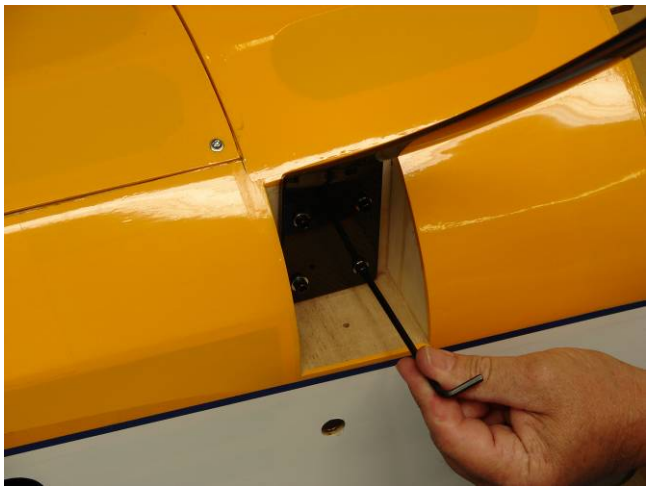
5. Align mounting holes in gear with pre installed blind nuts in mounting plate of fuse.



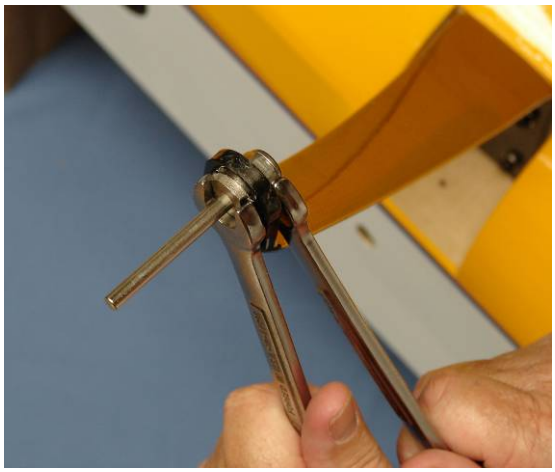
6. Assemble the landing gear bolts with lock washer and flat washer. Use a drop of blue Loctite on landing gear bolts before attaching the landing gear.



7. Bolt landing gear strut to fuse with (4) 4-40 bolts and washers. Ensure tapered edge of the gear strut is facing toward the rear.



8. Install the axle into the gear strut with nylon lock nut. Only snug tighten at this time.

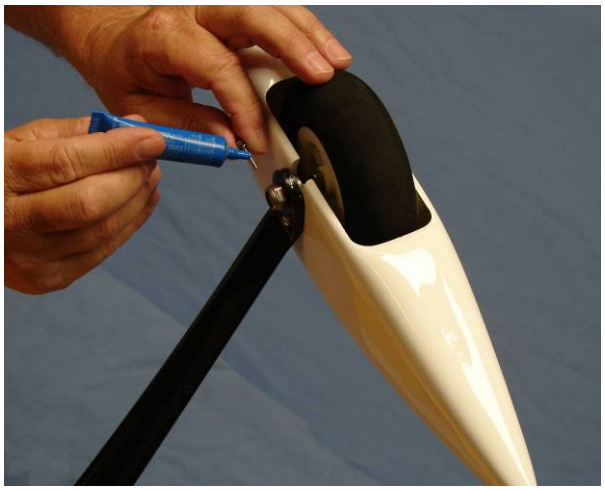


9. Align the flat sides of the axle bolt vertical and tighten the lock nut against the landing gear strut.

10. Install the inner wheel collar on the axle. Use a drop of blue Loctite on the wheel collar set screw and tighten the wheel collar in place.

11. Install the wheel and outer wheel collar. Use blue Loctite on the wheel collar set screw before final tightening.

12. Slide the lock washer then the flat washer on the wheel pant mounting bolts. Use blue Loctite on the bolts before final tightening.

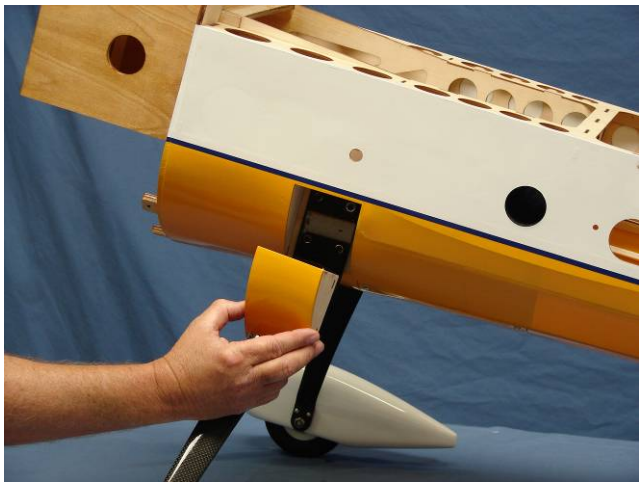


13. Final installation of wheel pant with two mounting bolts.

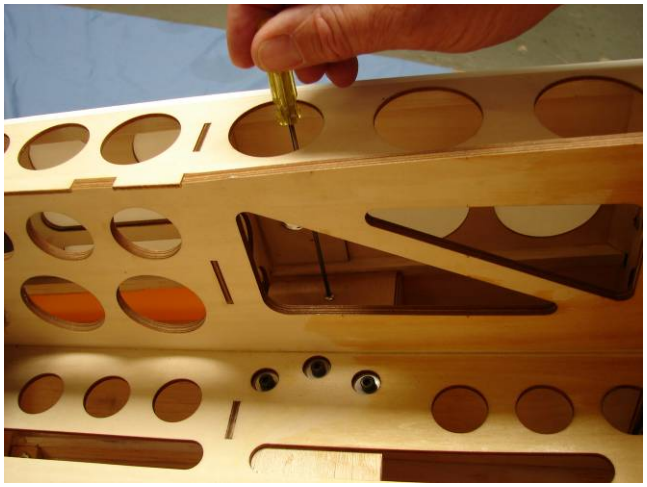
14. Repeat above steps for other wheel and wheel pant.

15. Reinstall the landing gear cover.

Repeat installation steps for other gear cover.



16. Reinstall landing gear cover bolt with Loctite and fasten firmly.



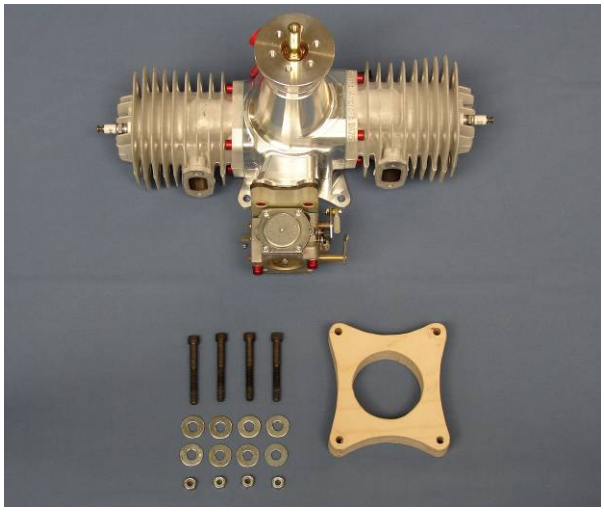
17. Final gear assembly with gear cover installed shown below.

ENGINE INSTALLATION

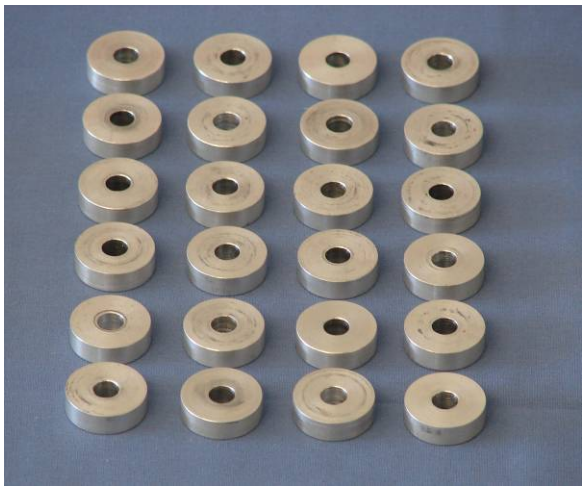
Engine Installation

1. The 150cc Yak 54 will accept a wide range of engine types. Illustrations for a DA-150 installation are provided below. Gather the engine, mounting hardware and ***supplied*** DA 150 hardwood mounting spacer block.

Note: Engine mounting hardware is **Not Supplied**



2. 6mm Machined Aluminum spacers are included to set the proper stand off distance for your engine if the DA 150 is not your engine of choice.



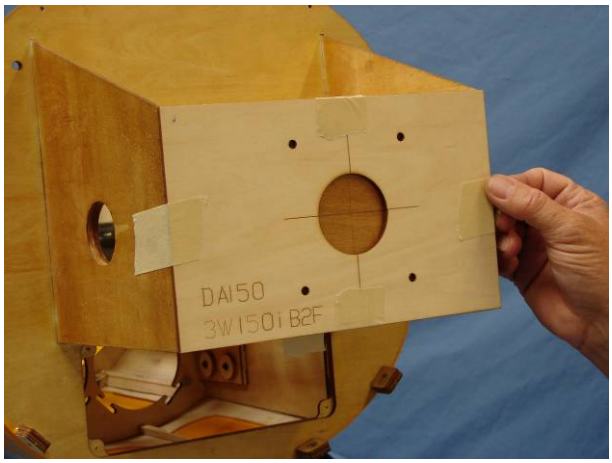
3. Locate the laser cut engine mounting template for the DA-150.

Note: If other engines are used the templates may be modified to fit you engine selection. Center your engine over the laser marked thrust lines on the template. Mark and drill the engine mounting hole locations for your engine. Follow the next steps for mounting your engine

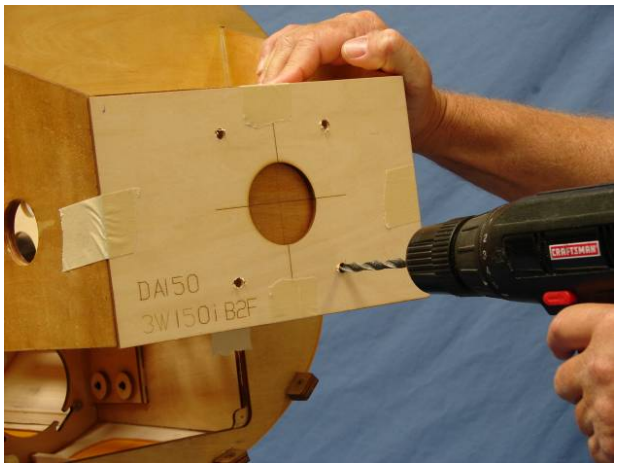
4. Remove mounting screws from the engine box hatch cover.

5. Remove the engine box hatch cover.

6. Align mounting template with firewall and tape in place.

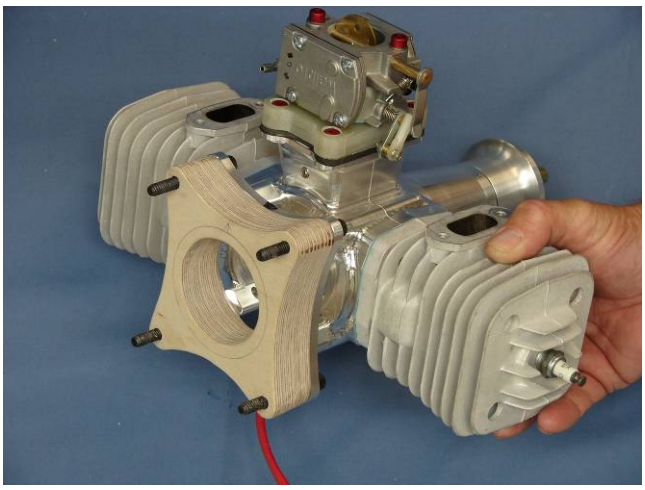


7. Use a 1/4 drill bit to drill the engine mounting holes in firewall.

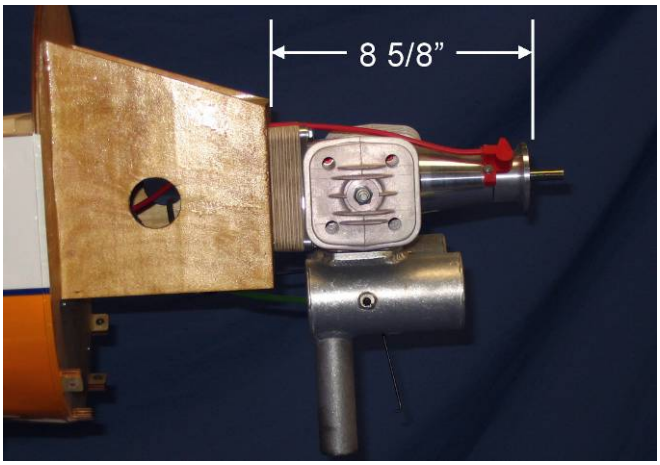


8. Using the provided DA150 wooden spacer mounting block. Install mounting bolts through engine mounting plate and spacer.

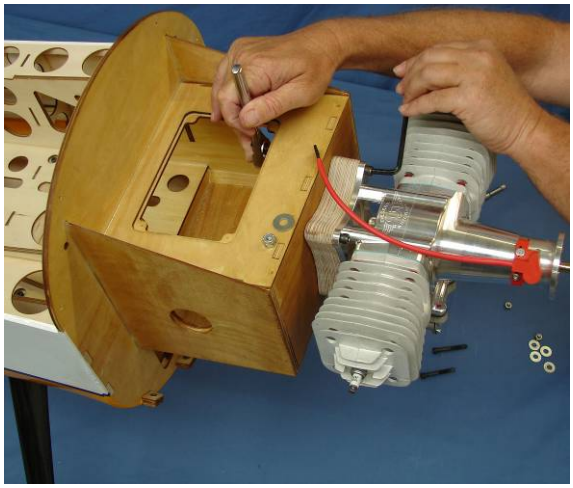
Note: Using the provided hardwood spacer rather then using conventional standoffs provides the engine with a solid mount to the firewall. This minimizes engine vibration, structural fatigue and wear and tear on your engine. This is the recommended method for mounting any engine.



9. Test fit engine to firewall. The required distance from the front of the firewall to the front of the prop mount on the engine is **8 5/8”** as shown below.



10. Insert the (4) bolts through the engine mount and spacer. Insert the bolts through the firewall and add fender washers and lock nuts to secure.

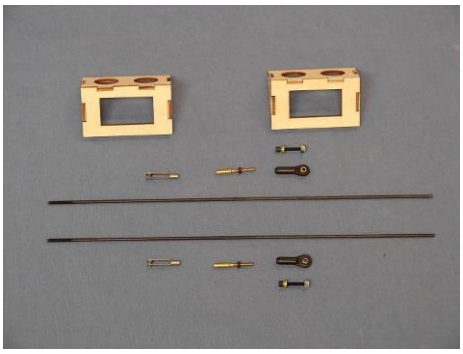


Throttle and Choke Servo Installation

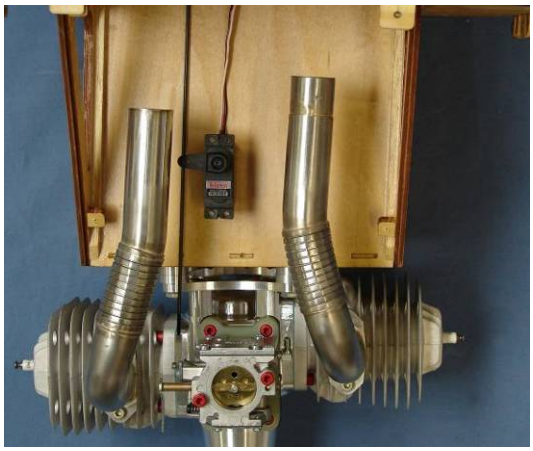
1. Gather the left and right plywood throttle and choke servo mounting trays, the throttle and choke servos and pushrod parts.

   2 x 4-40 metal rods thread at one end
   2 x 4-40 ball links and hardware
   2 x Brass spacers
   2 x 4-40 threaded solder couplers
   2 x 4-40 threaded quick links

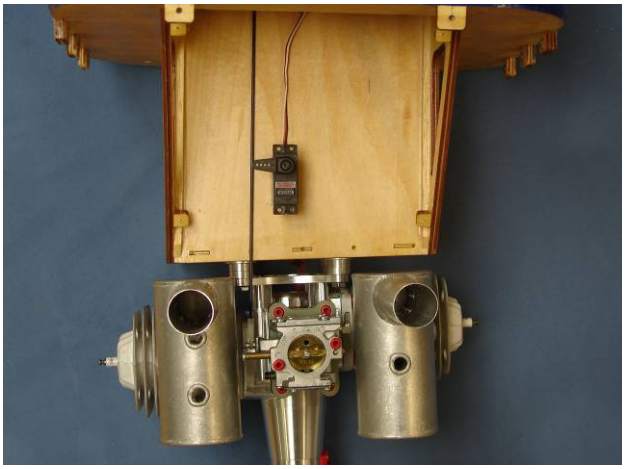
Note: Servo mounting trays have been supplied for your convenience. However, we have chosen to mount the throttle servo into the engine box floor. This allows for a fast and easy installation and provides a straight and precise throttle linkage connection.



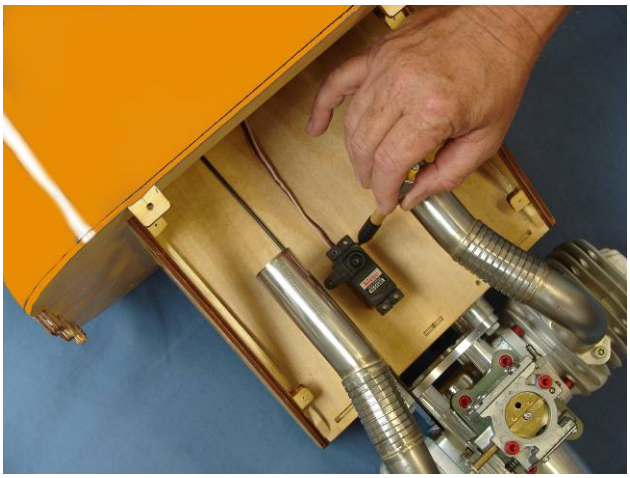
2. If canister mufflers are to be used, install the canister headers to the engine cylinder heads as shown. Attach the throttle pushrod to the engine throttle arm as shown. Layout the location of the throttle servo and throttle pushrod as shown. Ensure the servo and pushrod do not interfere with the canister muffler headers.



3. If standard style muffler cans are to be used, install the standard muffler cans to the engine cylinder heads as shown. Attach the throttle pushrod to the engine throttle arm as shown. Layout the location of the throttle servo and throttle pushrod as shown. Ensure the servo and pushrod do not interfere with the standard muffler cans.

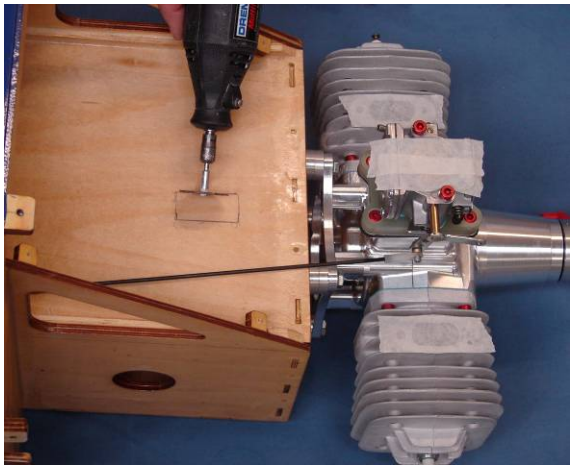


4. When the final location of the throttle servo is determined use a pencil to trace the outline of the servo onto the bottom of the engine box as shown.

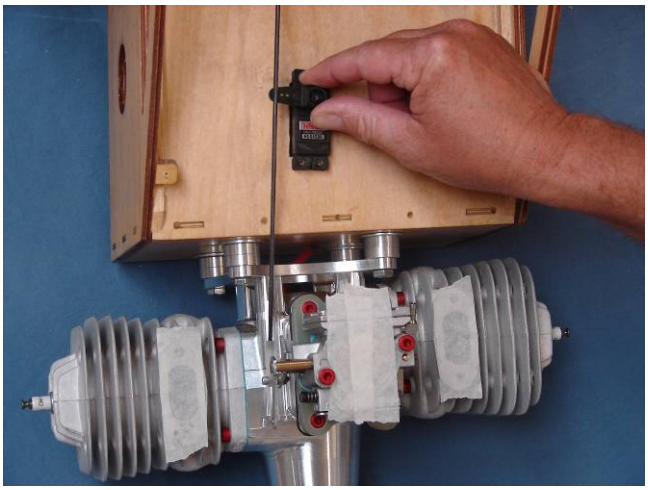


5. Use a rotary cutting tool to cut out the throttle servo mounting hole.

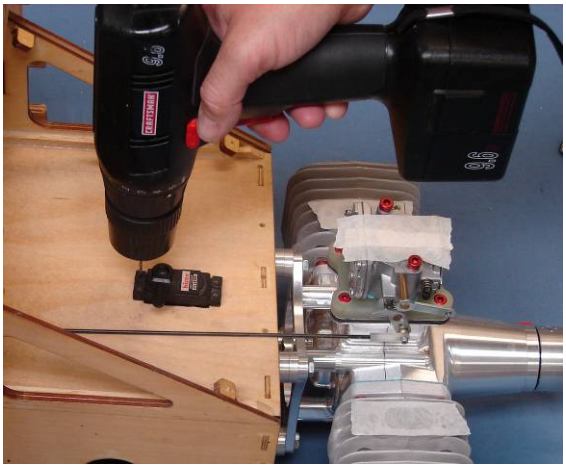
Note: Cover engine with a towel or cloth or use masking tape to protect from any debris getting into the carburetor or cylinders.



6. Insert the throttle servo into the servo cutout with the servo output arm toward the throttle pushrod as shown.

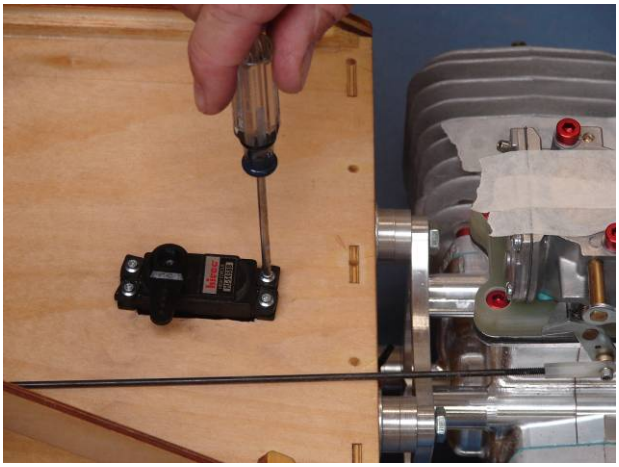


7. Mark and use a 1/16” drill bit for the servo mounting screws.



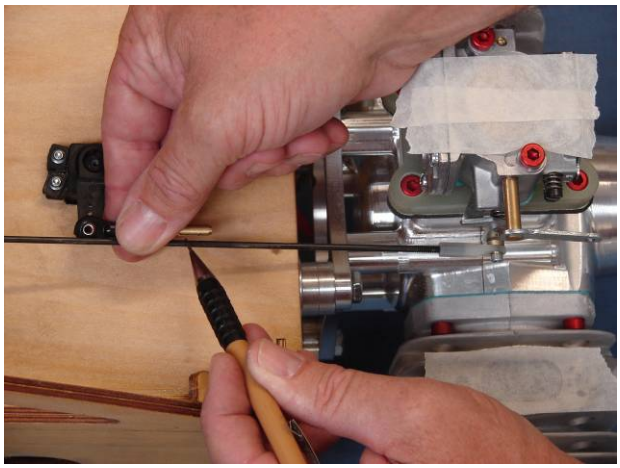
8. Mount the throttle servo using servo mounting screws.

Note: Place a drop of CA glue on the throttle servo mounting screws from inside the engine box to prevent loosening from engine vibration.

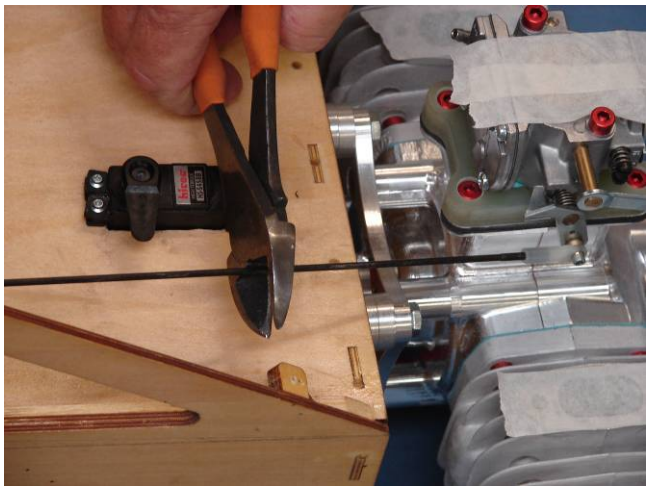


9. Thread a 4-40 ball link half way onto the threaded coupler as shown.

10. With the servo arm centered and the throttle arm of the carburetor at half throttle, measure and mark the end of the throttle pushrod wire that will be inserted into the threaded coupler as shown.



11. Cut the throttle pushrod to the proper length.

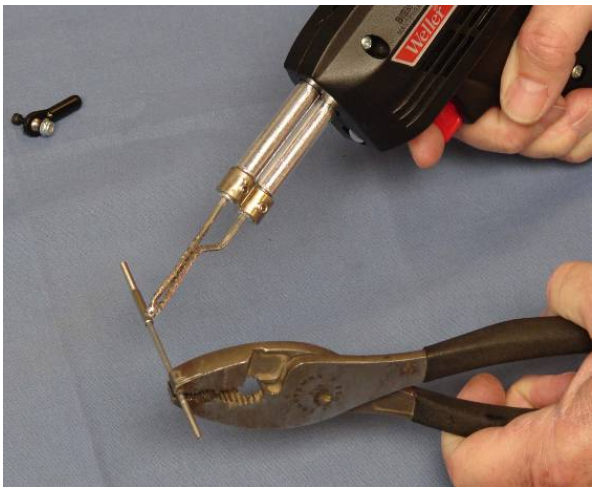


12. Gather the soldering tools as shown below.

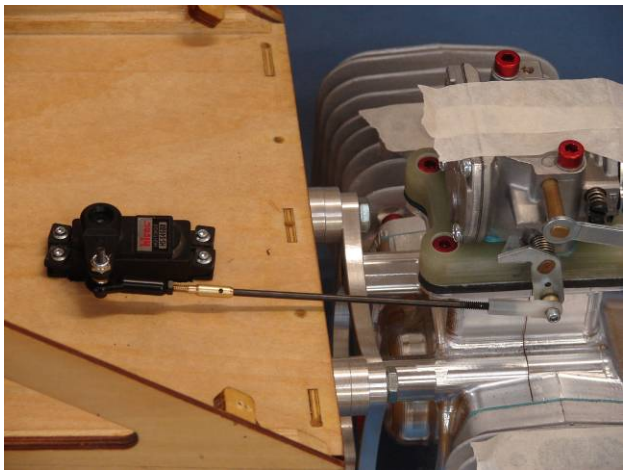
Note: For best results we recommend a high quality Silver Solder like “Sta-Brite” silver solder.

13. Solder the threaded coupler to the throttle pushrod wire.

Note: Lightly sand end of rod for best bond.



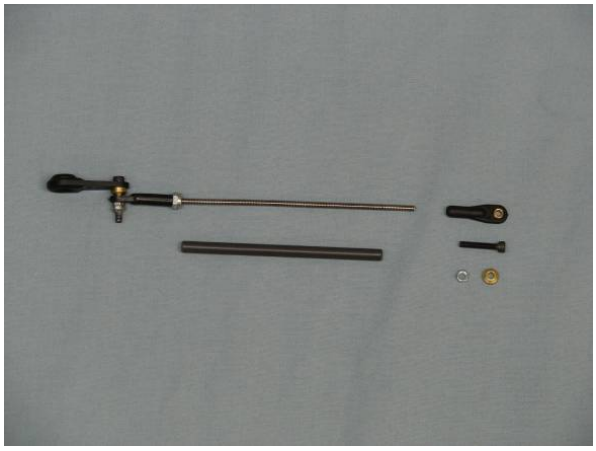
14. Attach the throttle pushrod with the 4/40 ball links and secure. Power up the receiver and throttle servo and adjust pushrod for proper operation. Ensure the servo or rod does not bind or jam at closed or full open positions.



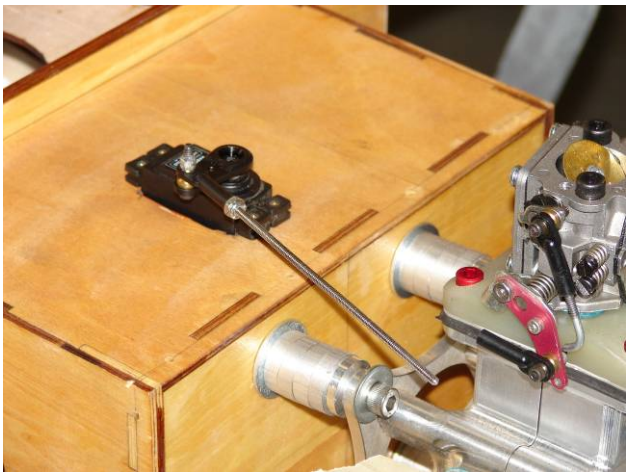
1. A none soldering method of attaching throttle pushrod is shown in the following steps.

   Hardware for this method is ***not supplied***.

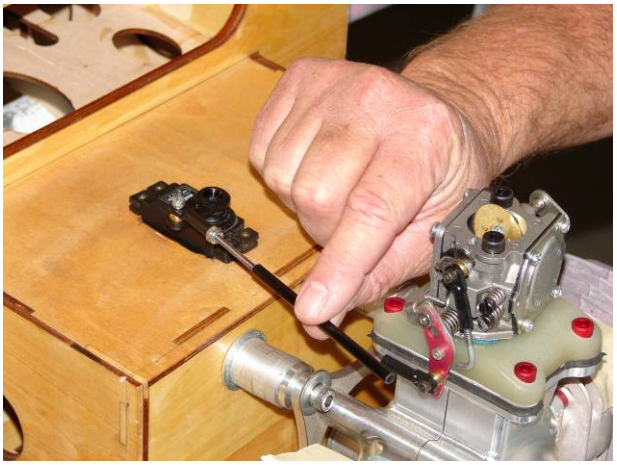
   Gather (2) 4-40 ball links, (1) brass spacer, 4-40 all thread, and carbon tube.



2. Attach 4-40 ball link and threaded rod to throttle servo arm.



3. Cut 4-40 rod and carbon rod to correct length Slip the carbon rod over the 4-40 threaded pushrod.



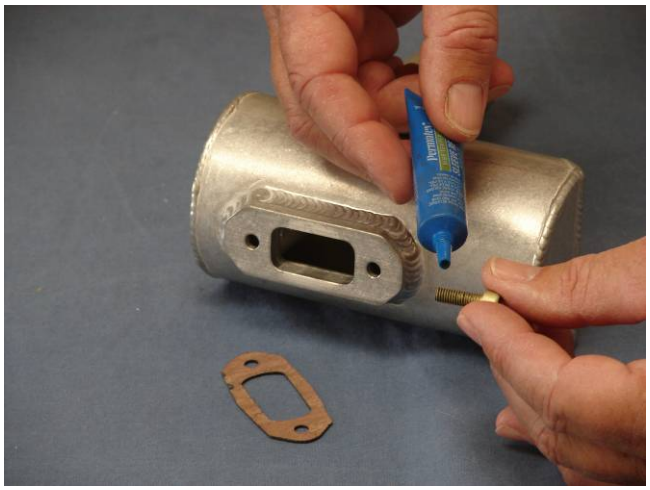
4. Install the throttle pushrod to the engine throttle arm as shown.

Standard Muffler Installation

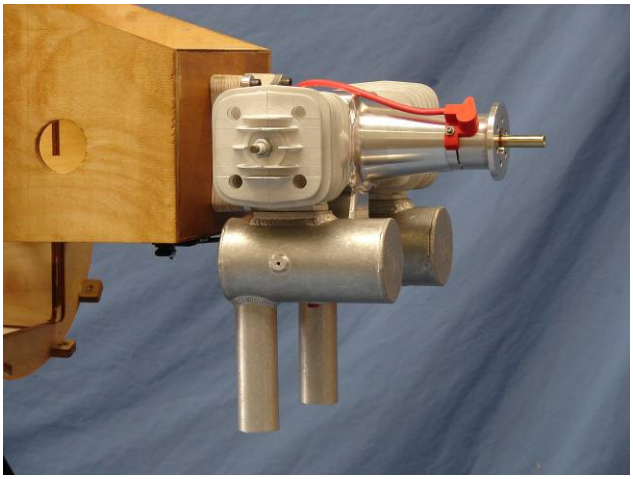
1. Gather the standard muffler parts as shown:

   Shown: **DA150-C (Compact muffler set)**
   Also fits: **DA150 (Standard muffler set)**

2. Use a drop of blue Loctite on muffler bolts before installation.



3. Install muffler cans using the supplied gasket or high temp silicon gasket material and securely bolt to cylinder heads as shown.



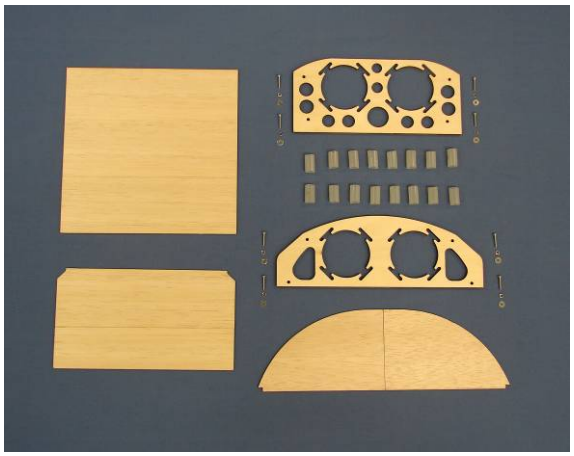
Greves Long Pipe Installation

1. Gather the headers and Greves pipe parts as shown:

   1 - 70mm drop flex header (left)
   1 - 70mm drop flex header (right)
   2 - Greves long pipes (Rear exit)
   2 - Teflon couplers
   4 - clamps

2. Gather the included pre cut balsa pipe tunnel sheeting, lite-ply pipe mounting brackets, pre cut silicone tubing and mounting hardware as shown below.

    2 x Pre cut balsa tunnel sheeting
    2 x lite-ply pipe mounting brackets
    16 x Pre cut silicon tubing
    8 x 4-40 mounting bolts
    8 x Flat washers
    8 x Lock washers



3. Use a sealing iron to ensure the covering is bonded to the bottom of the fuse frame around the pre cut air exit holes.

Note: If using standard mufflers, skip the following steps and go to ignition installation. Page #64

4. Use a hobby knife to remove the covering from the pipe tunnel pre cut air exit holes.

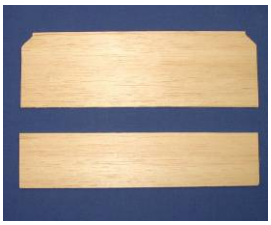
Note: There are pre cut holes for both canister and long Greves pipe installations. Take care to only cut out the required hot air exit slots.

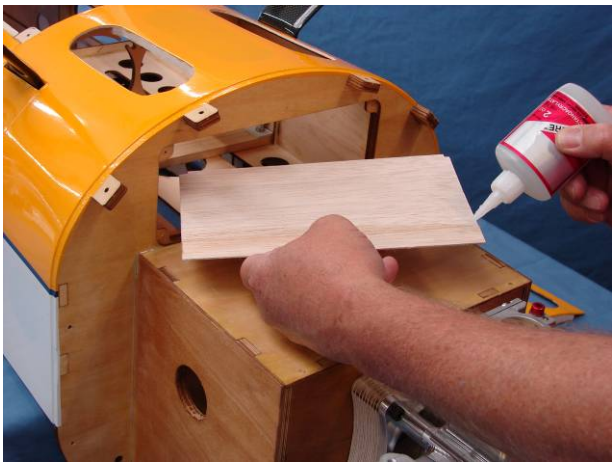
5. Covering removed from the eight hot air exit holes for the long Greves pipe installation at bottom of fuse.

6. Remove tunnel hatch cover from fuse bottom.

7. Dry fit the pre cut front tunnel balsa floor sheeting and trim as necessary. Apply medium CA glue to sheeting and install.

Note: For an easier installation it may be necessary to cut the balsa sheet into two pieces.



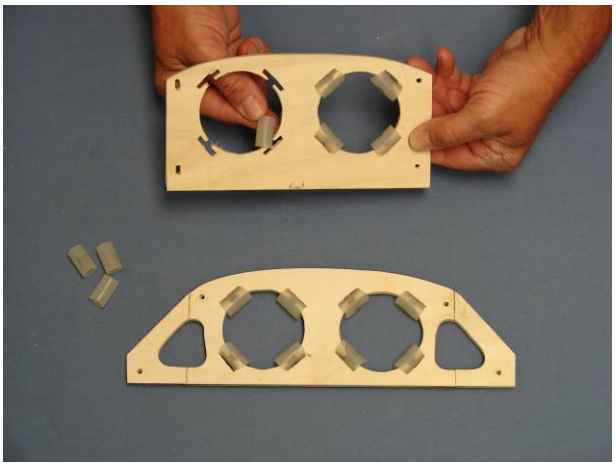


8. Front tunnel sheeting installed shown below.

9. Dry fit the pre cut rear tunnel balsa floor sheeting and trim as necessary. Apply medium CA glue to sheeting and install.

10. Rear tunnel sheeting installed shown below.

11. Insert the pre-cut pieces of silicon tubing into the plywood cutouts in the pipe mounting formers.

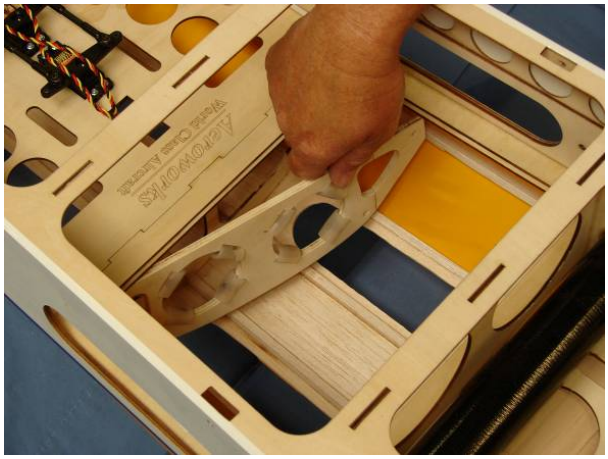


12. Mount front bracket to former with 4-40 mounting bolts, flat washers and lock washers. Apply blue Loctite to mounting bolts.

13. Securely tighten front mounting bracket to rear of fuse former.

14. Remove mounting screws and radio floor from fuselage.

15. Slide rear mounting bracket into position next to fuse former.



16. Mount rear bracket to former with 4-40 mounting bolts, flat washers and lock washers. Apply blue Loctite to mounting bolts.

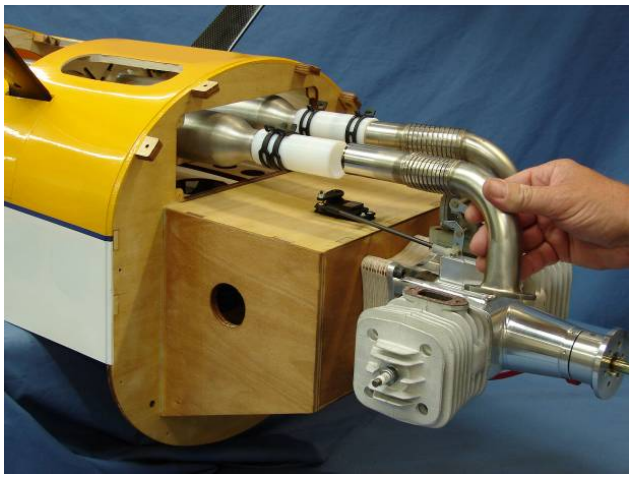
17. Securely tighten rear mounting bracket to fuse former.

18. Using twisting motion insert pipes into fuselage.

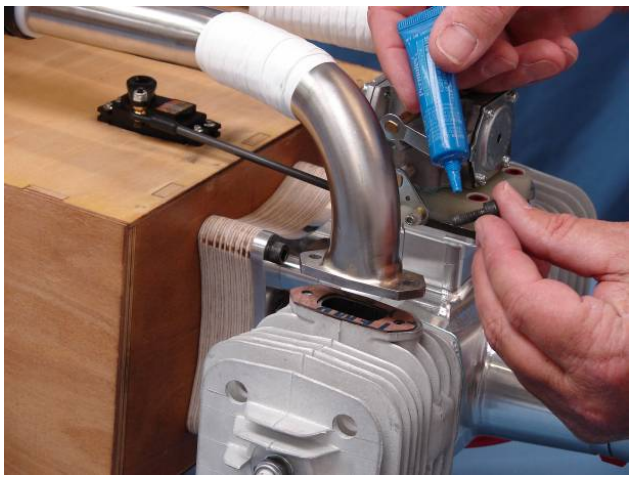
19. If necessary cut standard length headers to correct length. Check with header and pipe manufacturers for proper recommend header length. Insuring correct header length for your engine application will enhance overall engine performance.

Note: The Yak's fuselage has been designed for adjustable pipe lengths for optimal engine performance.

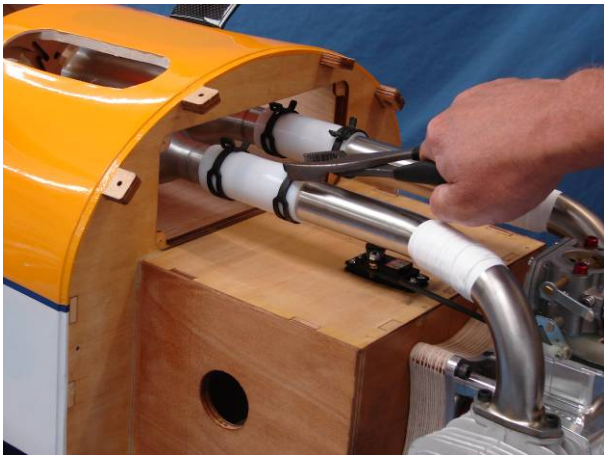
20. Assemble the pipes to the headers with the Teflon coupler and clamps in accordance with manufactures instructions.



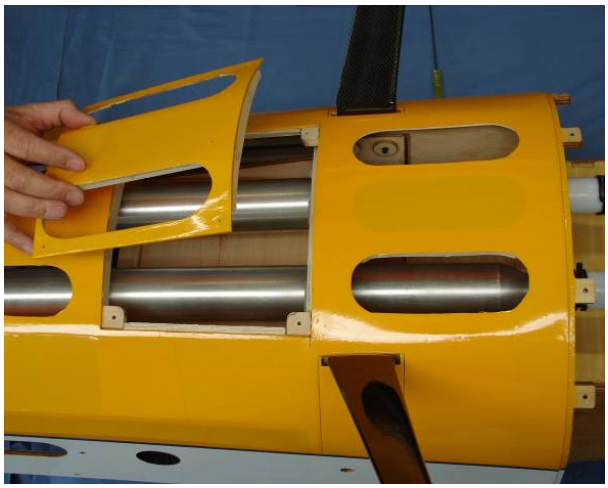
21. Use blue Loctite to secure header pipe bolts to engine. Remember to always use the engine manufacturer suggested gasket for proper seal



22. Make final adjustments and secure Teflon couplers with clamps.

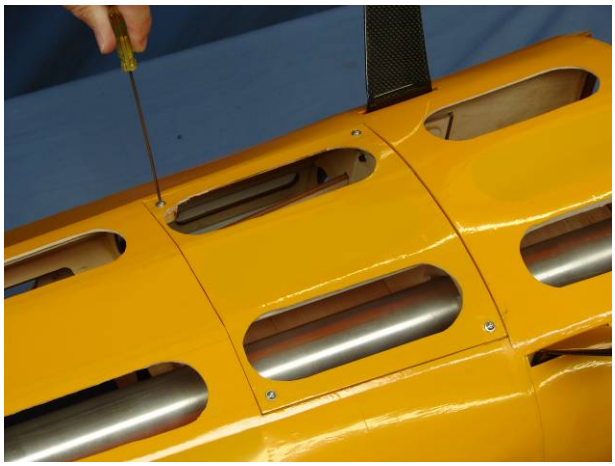


23. Position bottom tunnel hatch into place at bottom of fuse.

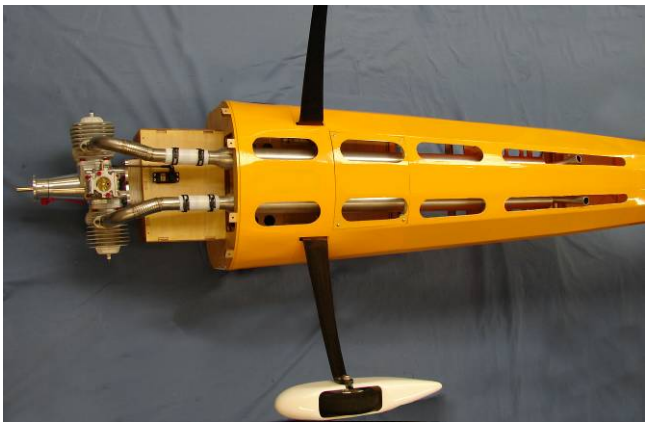


24. Apply blue Loctite to hatch mounting bolts.

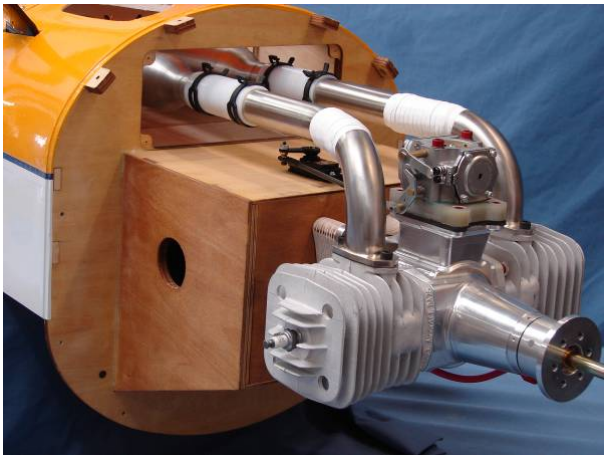
25. Assemble hatch to bottom of fuse.



26. Final Greves pipe installation with hot air exits slots cut out.



27. Front view of final pipe installation shown below.



Canister Muffler Installation

1. Gather the header and canister parts as shown:

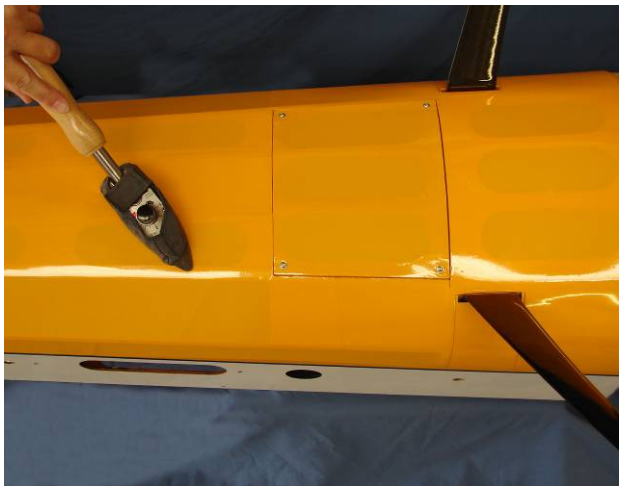
   1 - 70mm drop flex header (left)
   1 - 70mm drop flex header (right)
   2 - MTW-TD 110 Long canisters (Rear exit)
   2 - Teflon couplers
   4 - clamps

2. Gather the included pre cut balsa canister tunnel sheeting, and silicone tubing as shown below

   4 x Pre cut balsa tunnel sheeting
   8 x Pre cut silicon tubing

3. Use a sealing iron to ensure the covering is bonded to the bottom of the fuse frame around the pre cut hot air exit holes.

Note: If using standard mufflers, skip the following steps and go to ignition installation. Page #64



4. Use a hobby knife to remove the covering from the six canister tunnel pre cut hot air exit holes.

Note: There are pre cut holes for both canister and long Greves pipe installations. Take care to only cut out the required hot air exit slots.

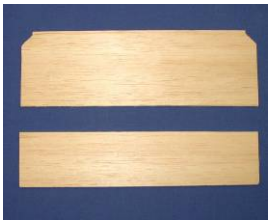
5. Covering removed from the six hot air exit holes

6. Remove tunnel hatch cover from fuse bottom.

7. Covering removed from the hot air exit holes and fuse canister hatch cover removed.

8. Dry fit the pre cut front tunnel balsa floor sheeting and trim as necessary. Apply medium CA glue to sheeting and install.

Note: For an easier installation it may be necessary to cut the balsa sheet into two pieces.

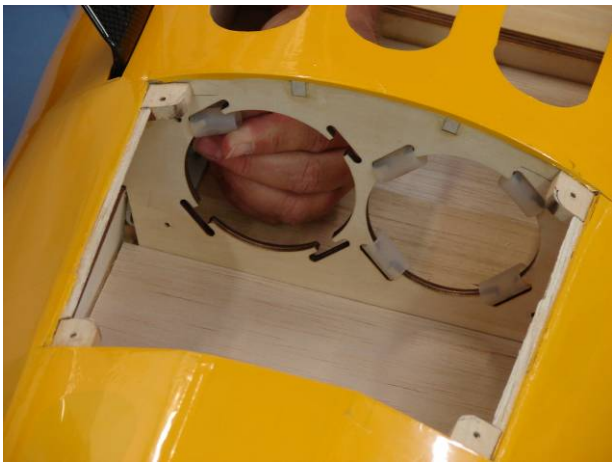


9. Front tunnel sheeting installed shown below.

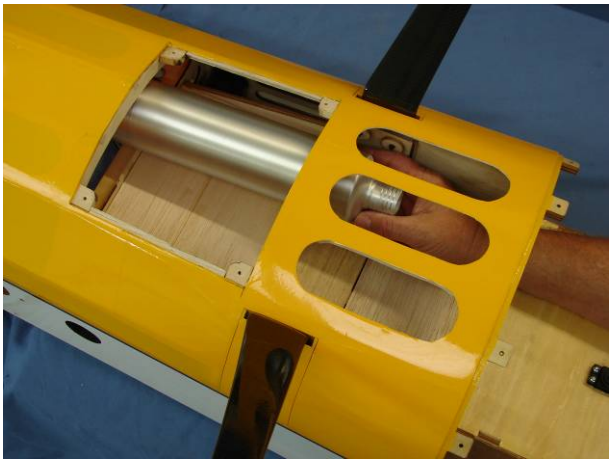
10. Dry fit the pre cut rear tunnel balsa floor sheeting and trim as necessary. Apply medium CA glue to sheeting and install.

11. Rear tunnel sheeting installed shown below.

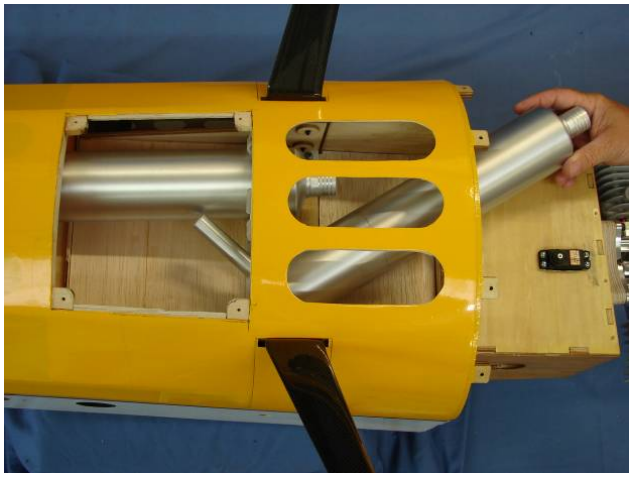
12. Insert the eight pieces of silicon tubing into the plywood cutouts in the pre-installed canister mounting former.



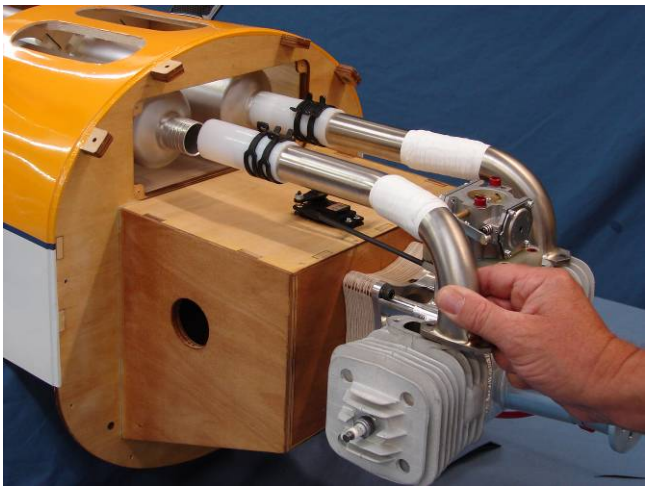
13. Insert first canister from front of fuse through the canister mounting former. Push canister back into fuse to allow easier installation of the second canister.



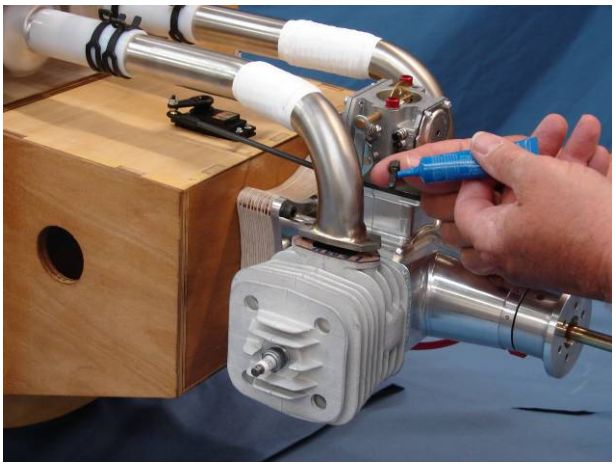
14. Insert second canister from the front of fuse through the canister mounting former. Position both canisters into proper position.



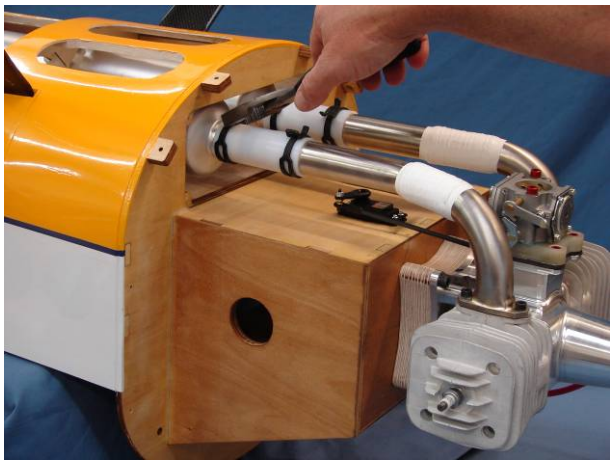
15. Assemble the canisters to the headers with the Teflon couplers and clamps in accordance with manufactures instructions.



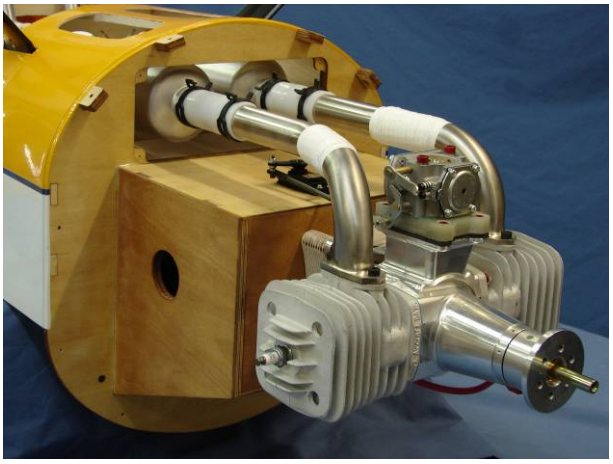
16. Use blue Loctite to secure header pipe bolts to engine. Remember to always use the engine manufacturers suggested gasket for proper seal



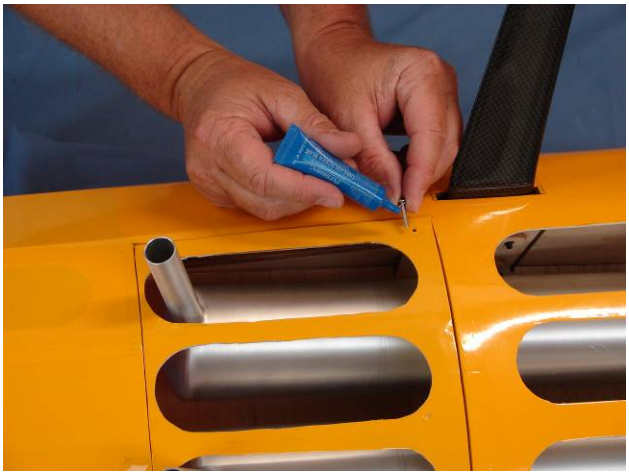
17. Make final adjustments and secure Teflon couplers with clamps.



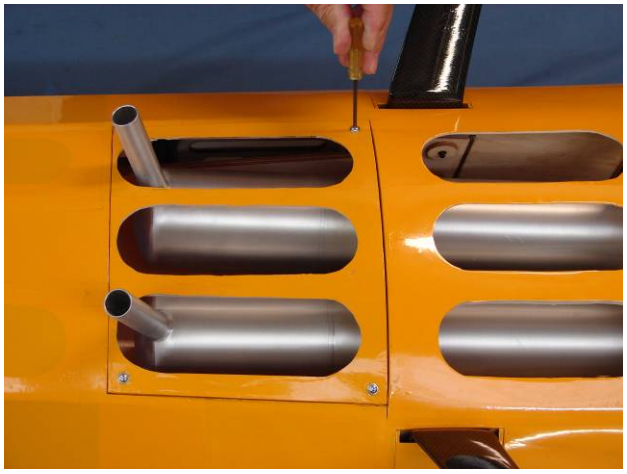
18. Front view of final canister installation shown below.



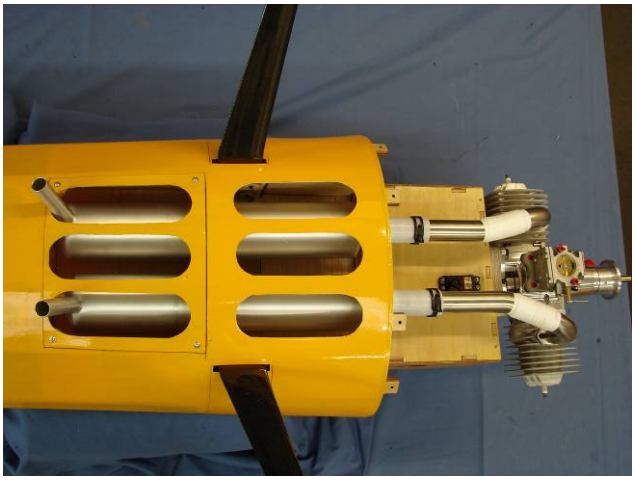
19. Apply blue Loctite to hatch mounting bolts.



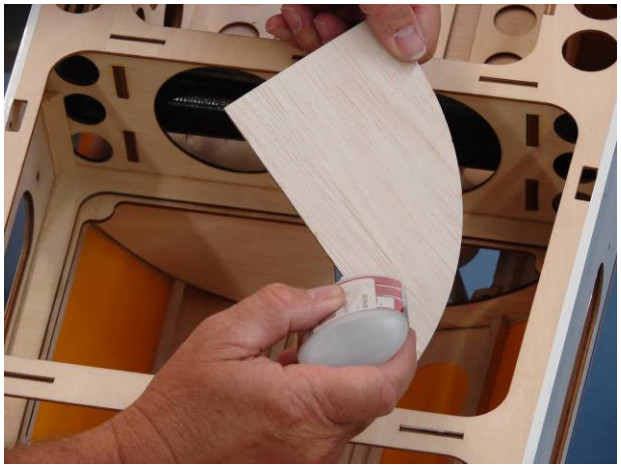
20. Assemble hatch to bottom of fuse.



21. Final canister installation with hot air exits slots cut out



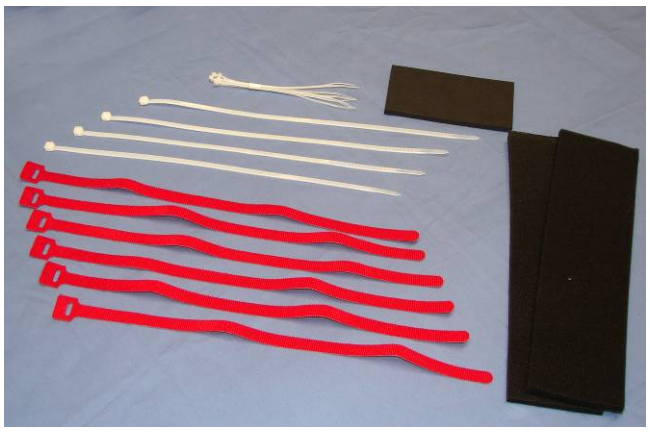
22. Dry fit both sides of the aft canister tunnel sheeting to fit behind the former just aft of the canisters. Apply medium CA glue to sheeting and install.



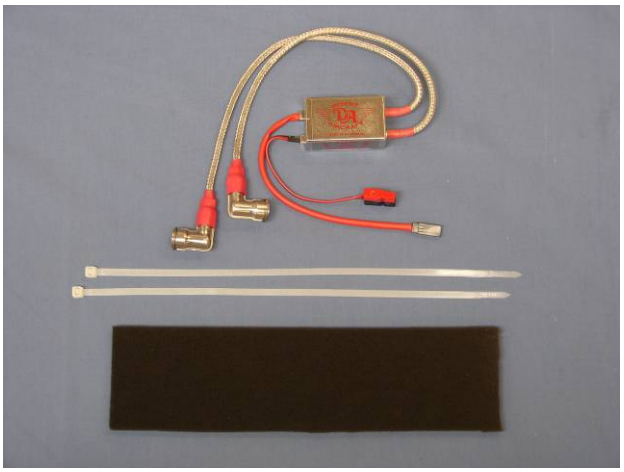
23. Both halves of the aft rear tunnel sheeting glued in place behind the former.

Ignition module Installation

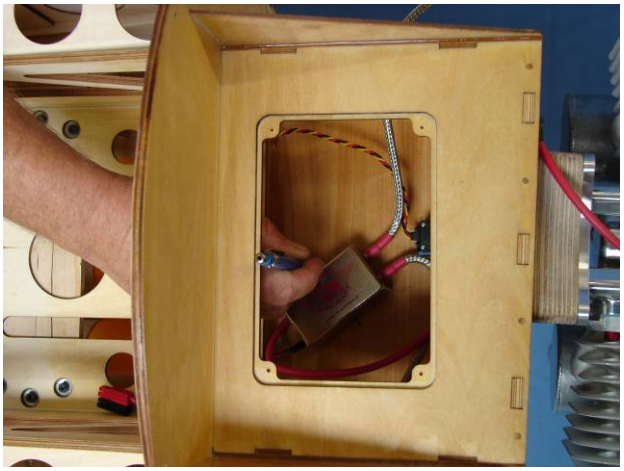
1. Gather the supplied mounting hardware to be used. Included in the kit are large and small nylon ties, One Wrap Velcro ties, and foam rubber pads as shown.



2. Gather the ignition module and mounting hardware as shown.

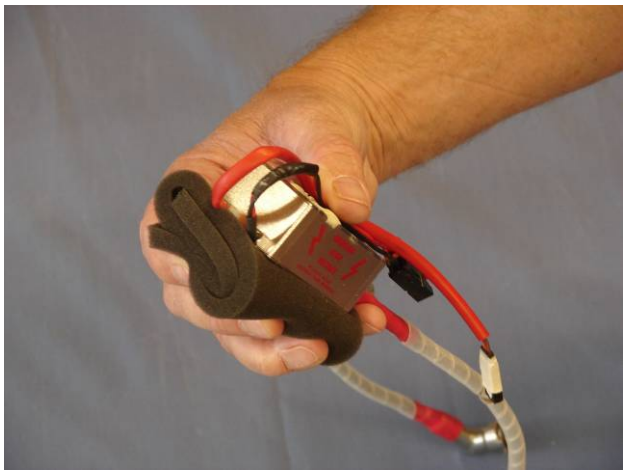


3. Position the ignition module inside the engine box to allow both of the spark plug leads to exit and properly connect to the engine without excess tension or chafing. Mark the location for the nylon tie mounting holes.



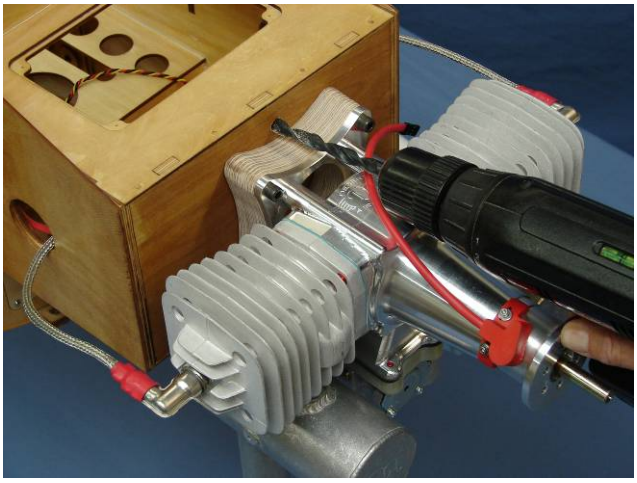
4. Use a 1/4” drill bit to drill the nylon tie mounting holes as shown.

5. Roll the supplied foam rubber to make a 4 layer pad as shown. Make the pad slightly larger than the ignition module.

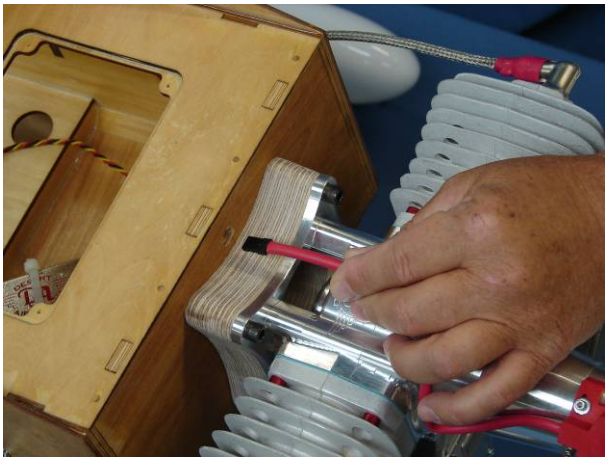


6. Install the ignition module and the foam pad with a nylon tie as shown.

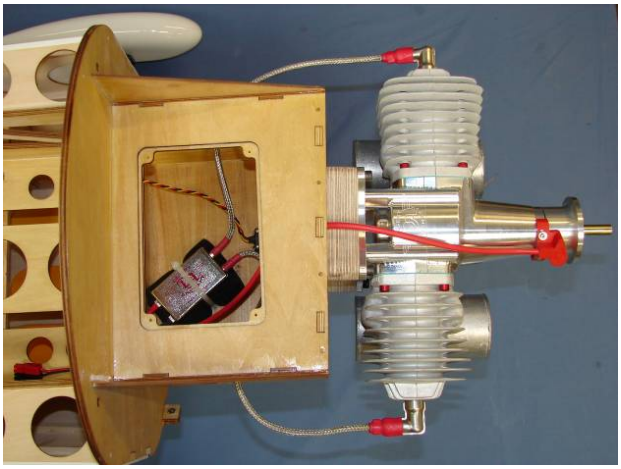
7. Use a 1/4” drill bit to drill the ignition timing lead hole in the firewall as shown.



8. Thread ignition connector through firewall and connect ignition timing connectors with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension.



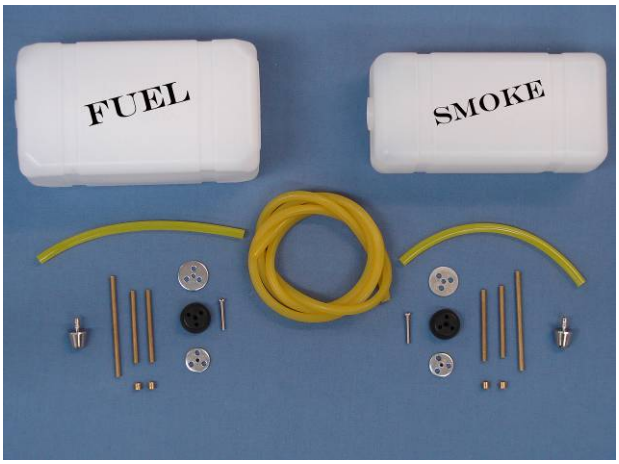
9. Final ignition setup shown below.



FUEL TANK ASSEMBLY AND INSTALLATION

Fuel Tank Assembly

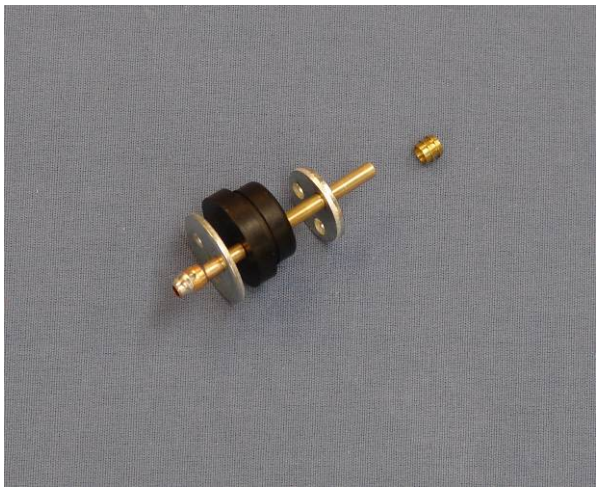
1. Gather the fuel tank parts as shown below. There are two tanks provided, 1500cc (50oz) for your fuel system and 1000cc (34oz) for your smoke system if used.



2. Locate the (4) supplied brass fuel barbs. Two for the fuel tank and Two for the smoke tank. Solder a brass fuel barb to the fuel line pick up tube. This will keep the weight of the fuel clunk from pulling the fuel line off the brass tube.

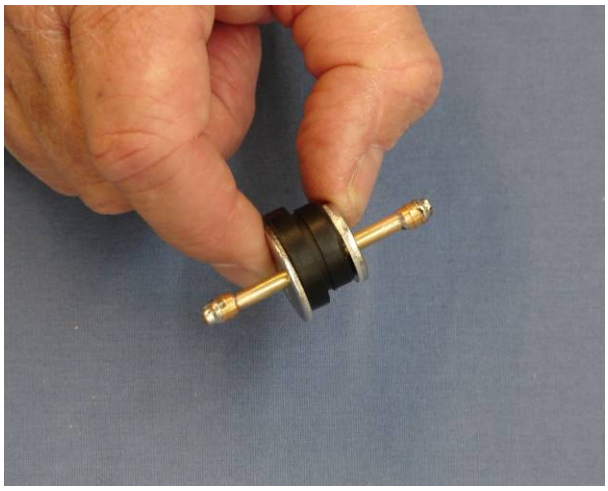
Note: No brass barbs are required for the air vent lines.

3. Assemble the fuel pick up line, rubber stopper and metal end caps. As shown below.

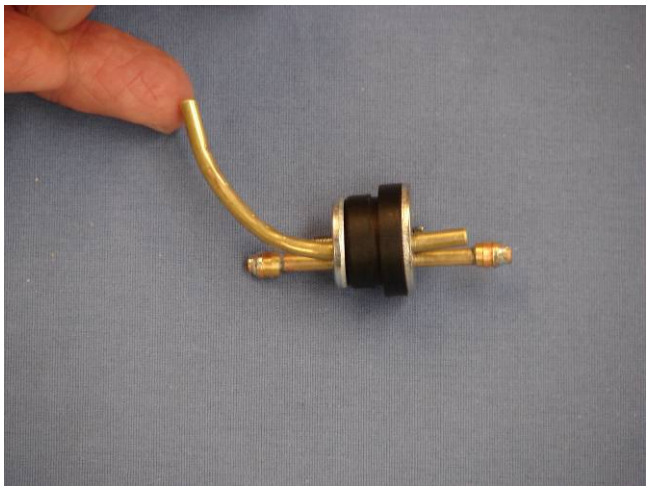


4. Solder a brass fuel barb to the other end of the fuel pick up line.

5. Final assembly of rubber fuel stopper with fuel pick up tube shown below.

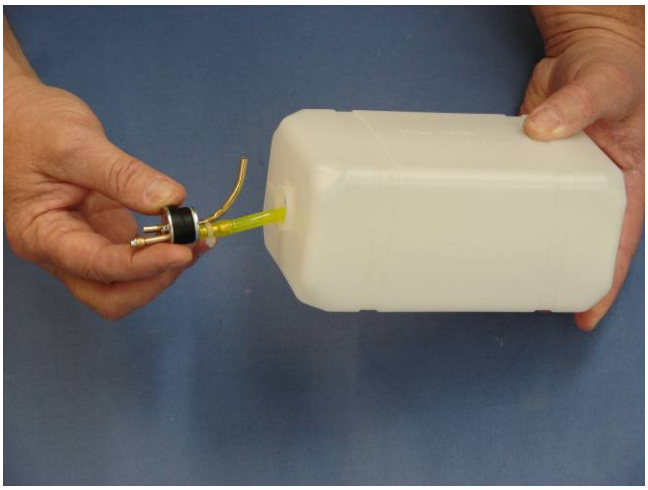


6. Install air vent tube into rubber stopper and bend upward. Air vent tube should rest as close to the top of fuel tank as possible. Without touching the top of the tank.

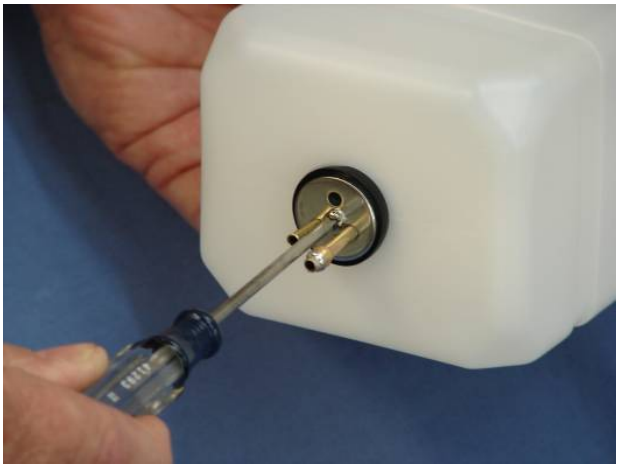


7. Install the fuel tubing and clunk. Secure the fuel tubing with nylon ties to the pick-up tube and clunk.

8. Insert the rubber stopper assembly into the tank with the vent tube at the top of the tank.



9. Secure the rubber stopper with set screw. Take care not to strip threads by over tightening set screw

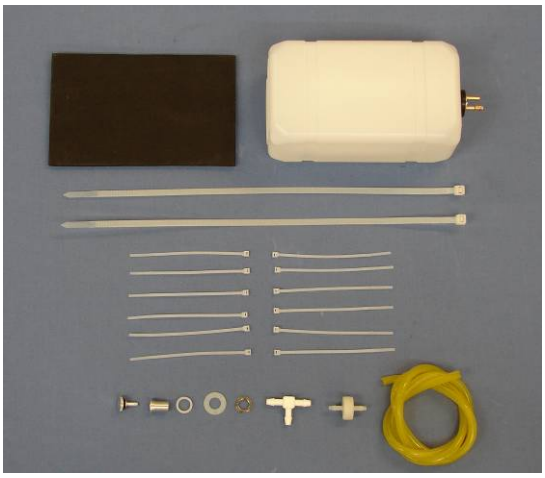


10. If using both the fuel and smoke tanks position them side by side as shown below.

Fuel Tank Installation

1. Gather the fuel tank parts as shown below. Fuel tank, fuel tubing, foam rubber, fuel "T", fuel filler dot, fuel filter and nylon ties.

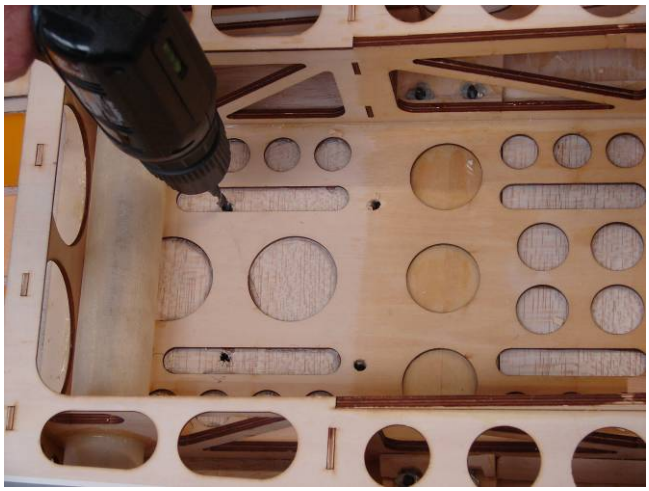
Note: The fuel "T", fuel filter and filler dot are not supplied, but are available through Aeroworks.



2. Place the fuel tank on the tank floor and mark the position of the nylon ties for mounting the tank.

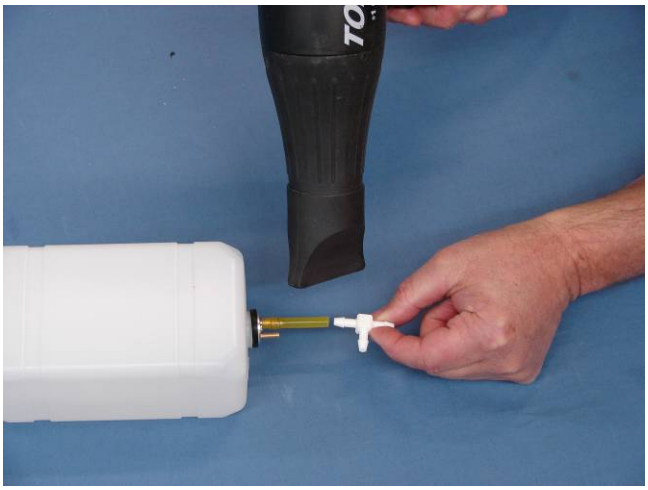
Note: If you are not using canister mufflers and have not sheeted the underside of the tank floors. It is not necessary to mark and drill the mounting holes for the nylon ties. (Skip to step 4)

3. Use a 1/4” drill bit to drill the tank nylon tie mounting holes.



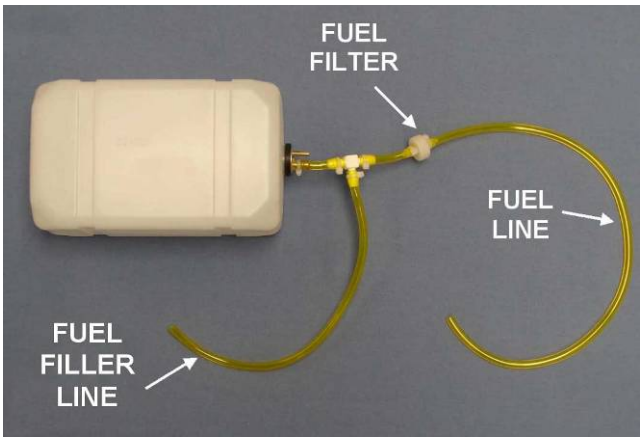
4. Install a short piece of fuel line and the fuel “T” to the fuel pick up tube.

Note: Using a heat gun and or soapy water solution to soften the fuel line will help with the installation of the fuel “T”.



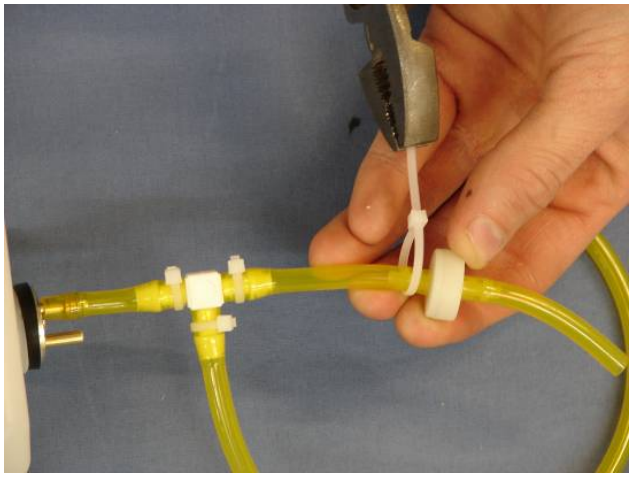
5. Install the fuel filter, fuel filler line and carburetor fuel line to the fuel tank. Be sure to leave enough fuel line to reach the engine carburetor and the filler dot.

Note: It is recommended you always use a fuel filter in the fuel line to the carburetor.



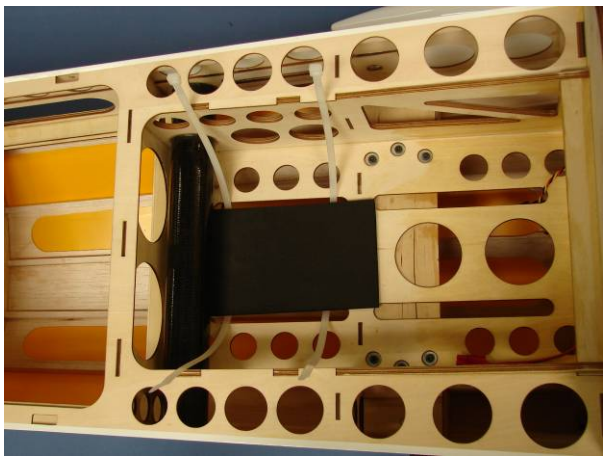
6. Use nylon ties to secure fuel line.

Note: Gasoline will cause the fuel line to swell over time. Always secure fuel lines with nylon ties to prevent them from pulling off during flight.



7. Thread nylon ties under tank mounting plate and center in position.

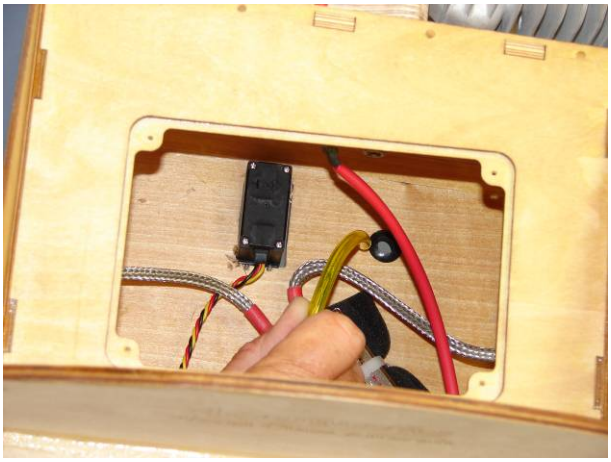
8. Install foam rubber pad for fuel tank to rest on. Foam rubber will help prevent fuel from foaming or getting air bubbles from engine vibration.



9. Cinch the nylon ties securely to hold the tank against the foam on the fuel tank floor. Cut off excess nylon tie material after tank is firmly installed.

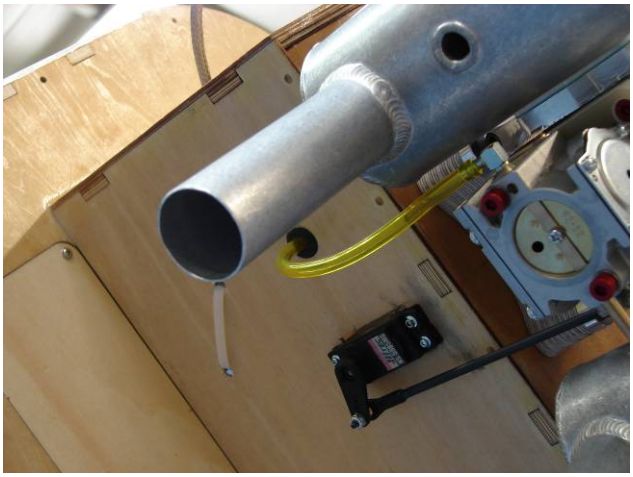
10. Mark and drill the fuel line exit hole in the bottom of the engine box.

Note: We have supplied rubber grommets for you to route the fuel line through to give a finished professional look.



11. Route the line to the engine carburetor out of the bottom of the engine box. Use rubber grommet where the fuel line goes through the plywood to prevent fuel line chafing. Secure all fuel lines with nylon sip ties.

Note: It is recommended you always use a fuel filter in the carburetor line.



12. Determine which side of fuse you will mount the fuel filler dot. Mark the wing leading edge location to prevent interference with the wing when installing the filler dot.

13. Gather the fuel filler dot and drill bits as shown below.

Note: We recommend you start with a smaller size drill bit then increase the bit size to the correct size to fit your filler dot. This will help prevent the fuse side from splitting or cracking.

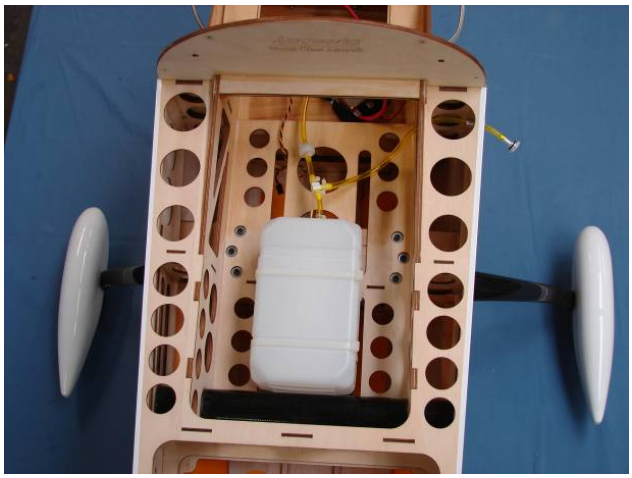
14. Mark the location of the fuel filler dot.

Note: The higher you mount the fuel fill dot the less fuel will siphon out when fueling.

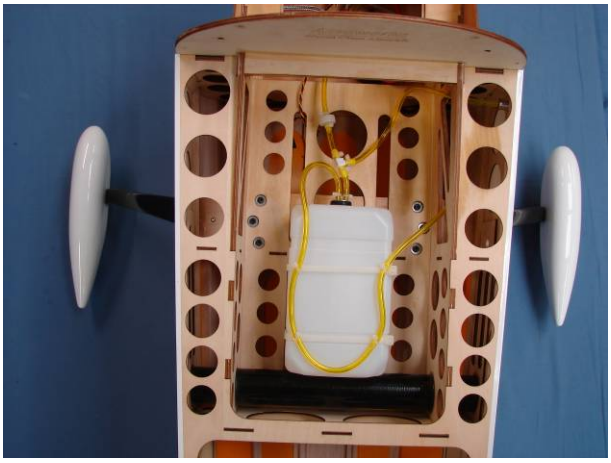
15. Drill hole to accommodate fuel filler dot.

16. Final installation of Fuel filler dot shown below.

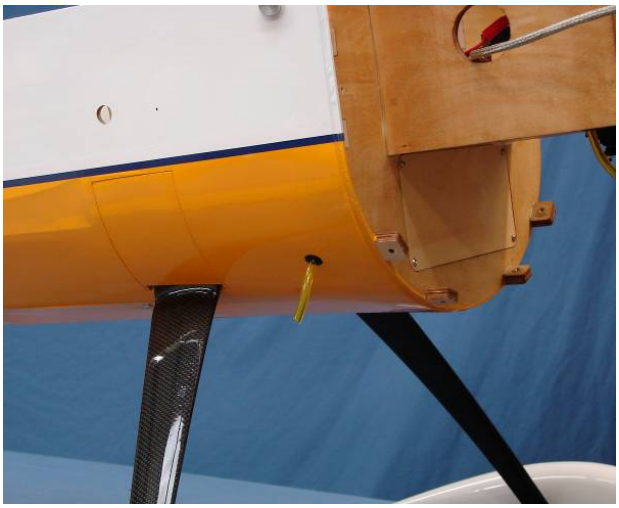
17. Fuel tank shown with fuel filler dot, fuel filter and engine fuel line installed.



18. Route the vent line on top of the fuel tank and secure with small nylon ties as shown. This will stop excess fuel from draining out the vent line during an extended down line or when lifting the tail.

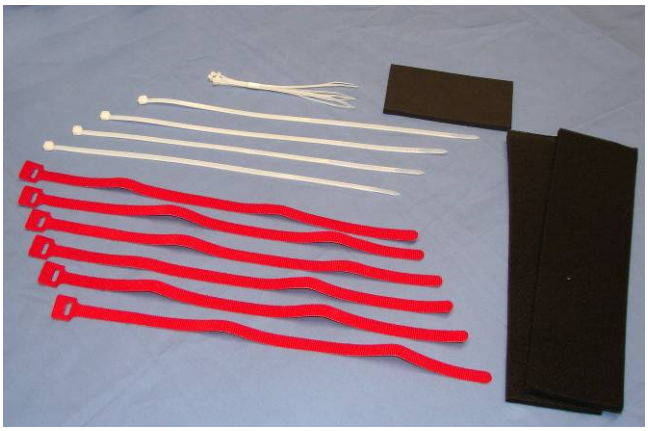


19. Install fuel vent line as shown below. Using rubber grommet for a professional finish.

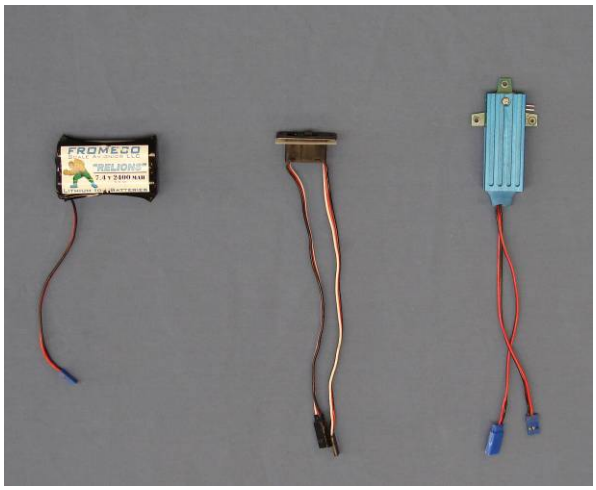


Radio Installation

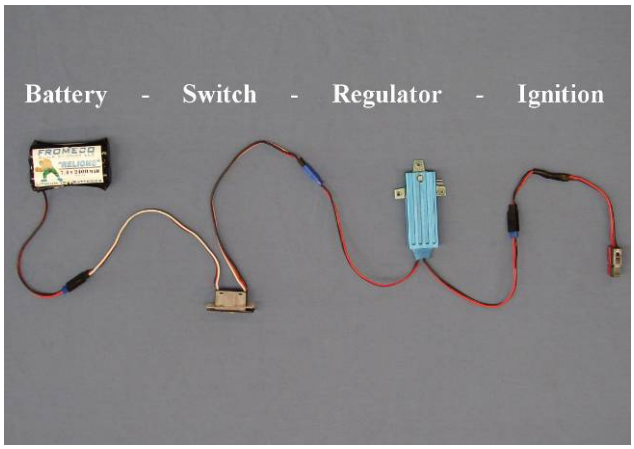
1. Gather the supplied mounting hardware to be used. Included in the kit are large and small nylon ties, One Wrap Velcro ties, and foam rubber pads as shown,



2. Gather the ignition battery, switch and voltage regulator as shown.

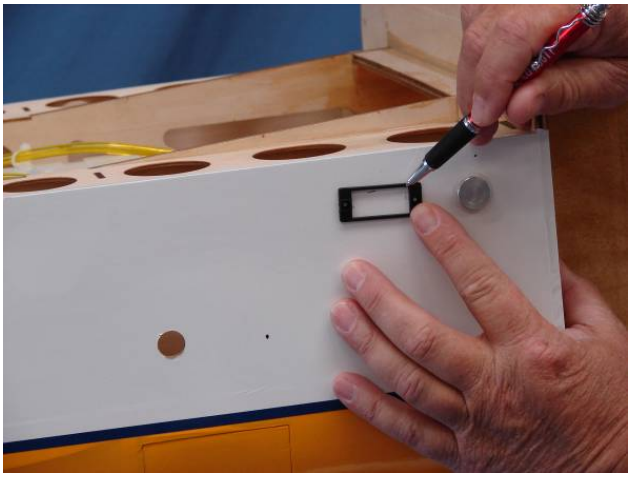


3. A typical battery arrangement is shown below.



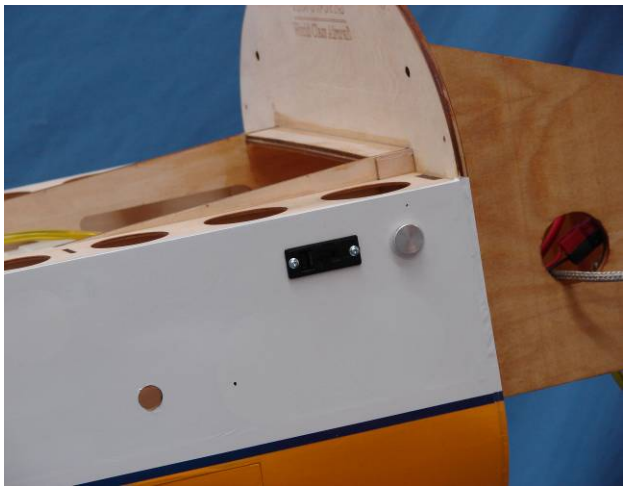
4. Fit the wing to the fuselage and check that the switch location will not interfere with the mounting of the wing. Mark the location of the wing leading edge on the fuse to avoid conflict with the switch mounting location.

5. Mark the location for ignition switch using the switch mounting plate for a template.



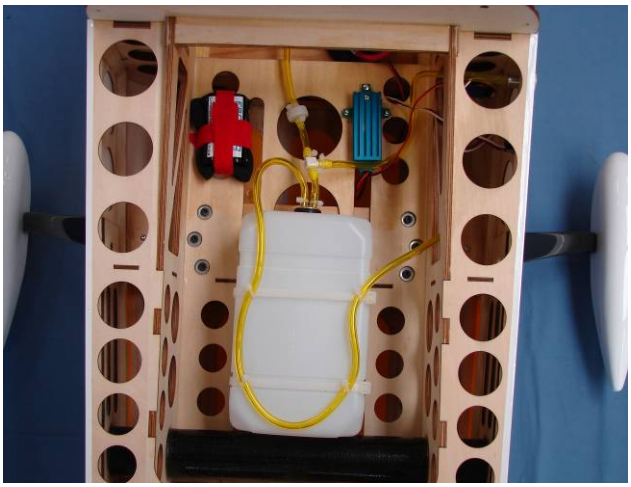
6. Use a rotary cutting tool or a hobby knife to cut out the switch mounting holes.

7. Mount switch in accordance with the switch manufacturers instructions and hardware.

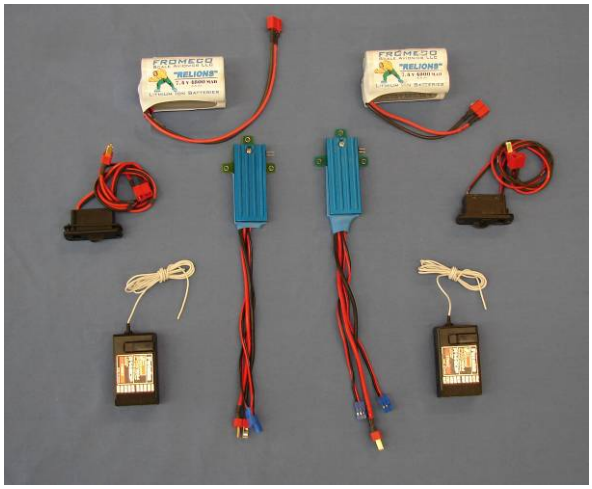


8. Roll the supplied foam rubber to make a 4 layer pad as shown. Make the pad slightly larger than the ignition battery as shown.

9. A typical ignition installation shown below. Secure the ignition battery with supplied one wrap Velcro ties. Secure the regulator to the fuse floor using manufactures suggested instructions.

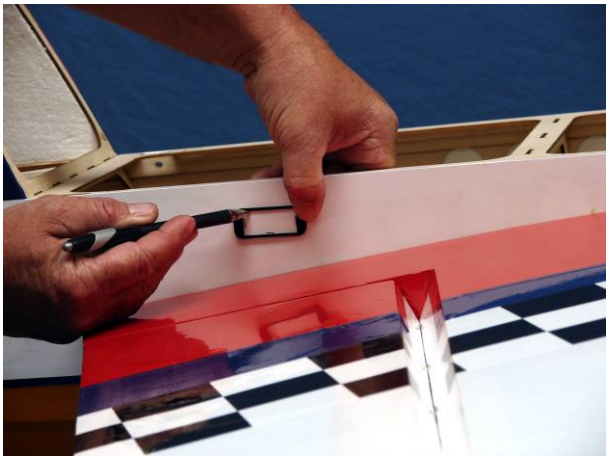


10. Gather the receivers, batteries, switches and regulators as shown below.



11. We chose to mount the radio switches towards the rear on both the left and right sides. Mark the location for radio switches using the switch mounting plate for a template.

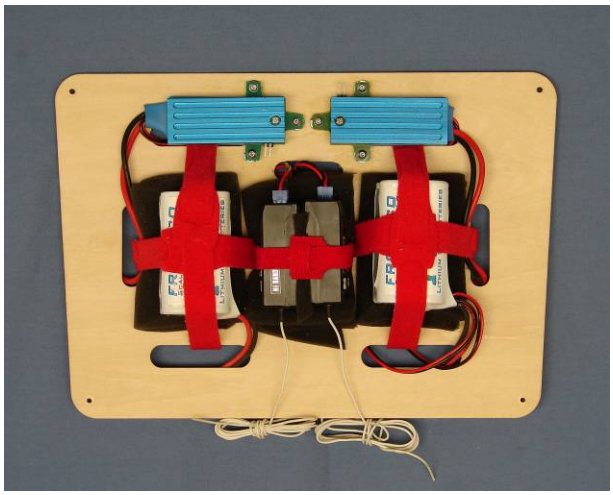
Note: Ensure switch does not interfere with the mounting of the wing.



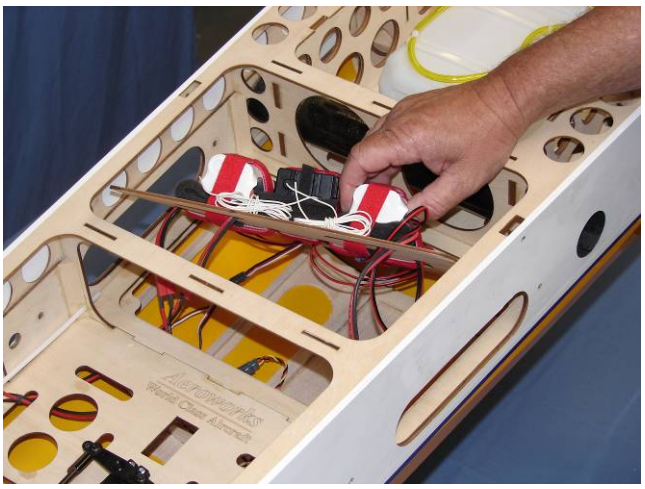
12. Typical switch mounting location shown below.

13. A typical radio installation shown below. Secure the batteries using the supplied one wrap Velcro ties and mount the regulators to the fuse floor using manufactures suggested instructions.

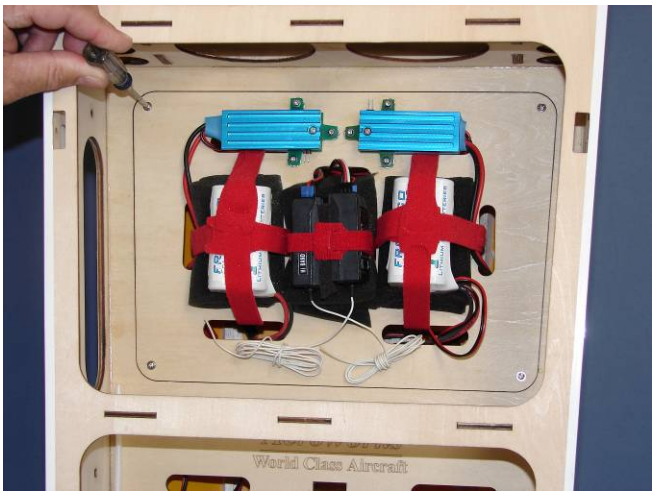
Note: For an easier radio installation remove radio floor from fuse.



14. Secure all connectors with safety wire, string, tape, or other method. Ensure the connectors will not come apart from vibration or light tension.



15. Secure radio floor with mounting screws.



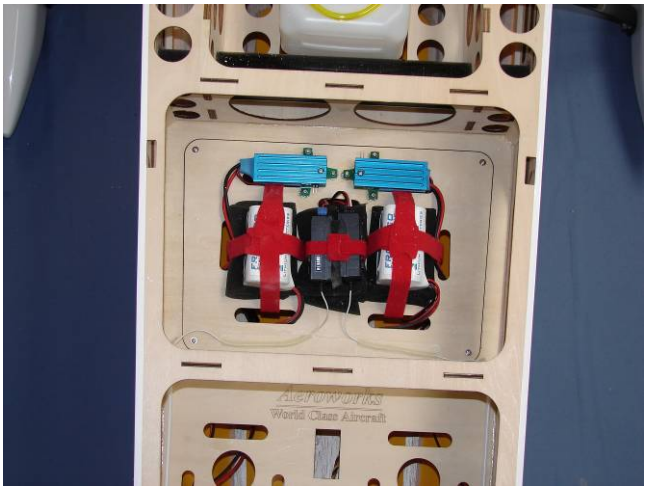
16. Apply baby powder or corn starch to antenna wires to assist getting antennas into their guide tubes.

17. Push receiver antennas all the way into the pre installed receiver antenna guide tubes.

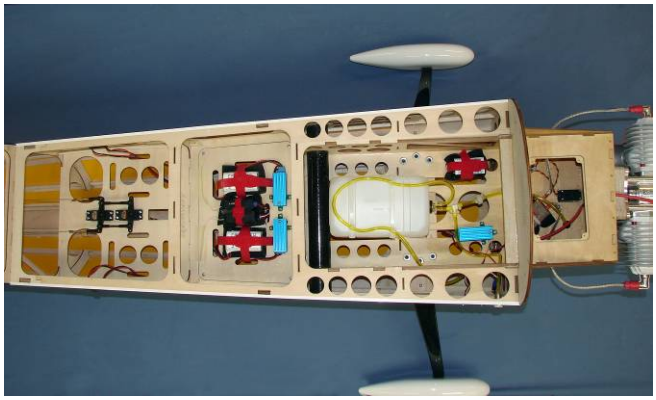
18. Tape the receiver antenna wires to the end of the antenna guide tubes and to the radio floor as shown. This will prevent the antenna wire from vibrating back out.

19. Attach all servos, battery, regulator, and switch leads to the proper connectors.

    A typical radio installation is shown below.



20. Typical radio, ignition and fuel tank installation shown below.



Cowl Preparation for Standard Mufflers

1. Gather the cowl and provided standard muffler exhaust stack exit hole template material as shown below.

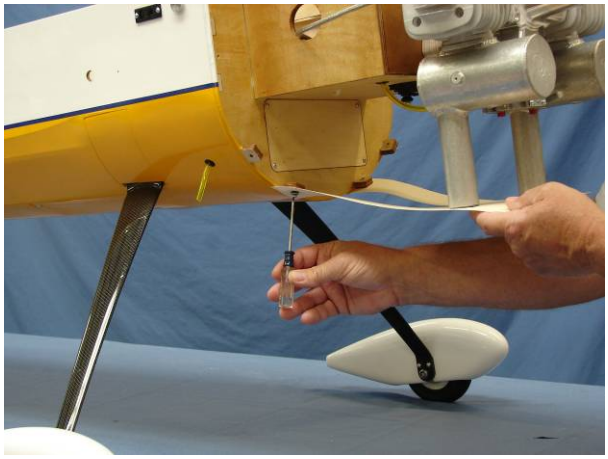
Note: The following steps are if you are using standard style mufflers. If using **canister or Greves pipe** exhaust skip to page 81 step number 10 For cowl attachment steps.

2. Test fit template material to bottom of cowl as shown. Insuring template alignment holes match with cowl mounting holes.

Note: Your cowl comes with Pre Cut hot air exit holes for typical engine installations. We have found this to be adequate cooling for the DA150. Depending on your engine's operating temperature, you may need to allow for more exit air cooling for your engine to run at its recommended operating temperature.

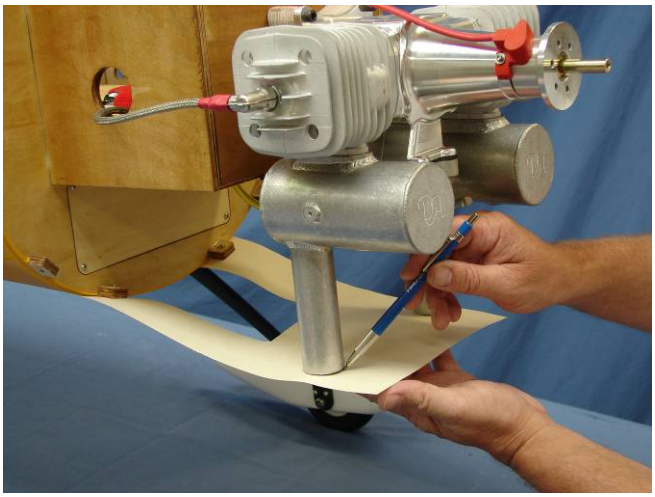
Always check the operating temperature of your engine to prevent any damage from occurring. Aeroworks is not responsible for damages incurred from improper engine cooling.

3. Using cowl mounting location on bottom of fuselage and cowl mounting bolts. Attach template material to fuselage.

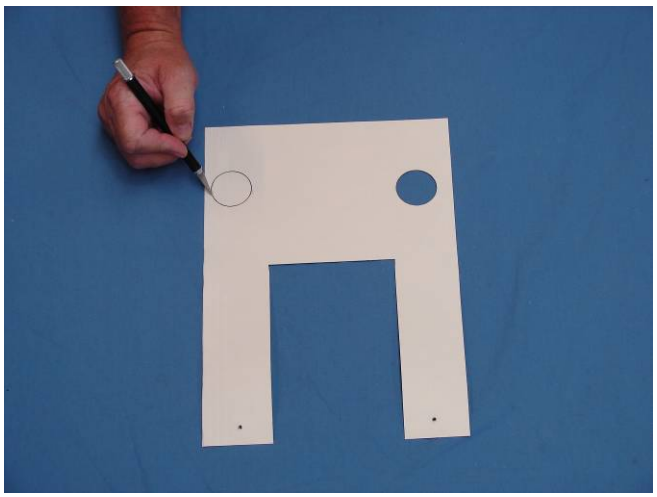


4. Lift the template material so that it contacts the bottom of the muffler exhaust stacks. Trace the location of the exhaust stack exit holes.

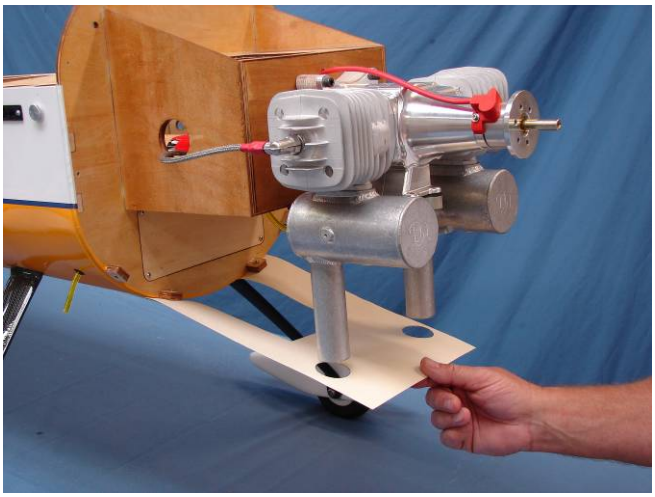
Note: Mark the template **"Cowl Side"** for easy reference when fitting to cowl.



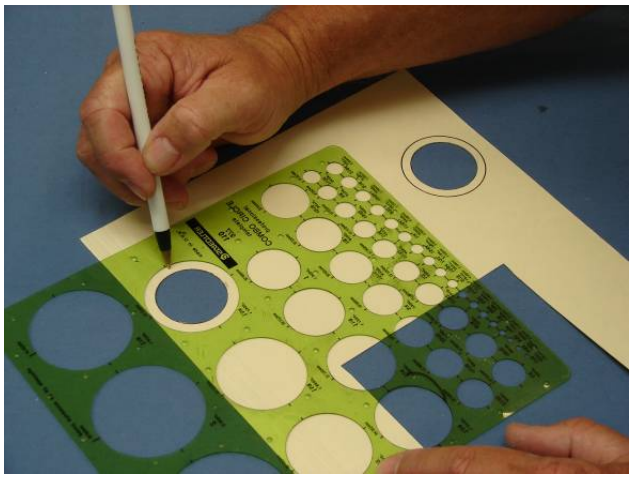
5. Using a hobby knife cut out the exhaust stack exit holes.



6. Trial fit the template until the proper size and location of holes are achieved.



7. Enlarge the holes to allow a 1/4" clearance around the outside edge of the exhaust stack tubes.



8. Re attach template to cowl and mark cut locations for exhaust stack exit holes.

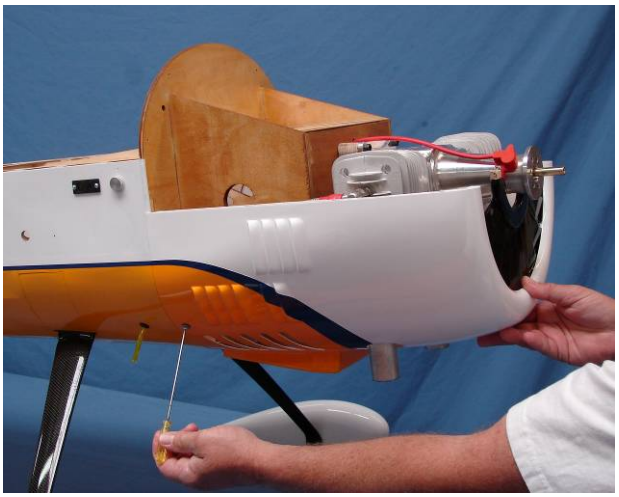
Note: Take care and test painted areas prior to using any type of paint remover, rubbing alcohols or cleaners to remove any pen lines

9. Use a rotary cutting tool and sanding drum to cut the exhaust stack exit holes as needed.

Note: We have found this to be adequate cooling for the DA150. Depending on your engine's operating temperature, you may need to allow for more exit air cooling for your engine to run at its recommended operating temperature.

Always check the operating temperature of your engine to prevent any damage from occurring. Aeroworks is not responsible for damages incurred from improper engine cooling.

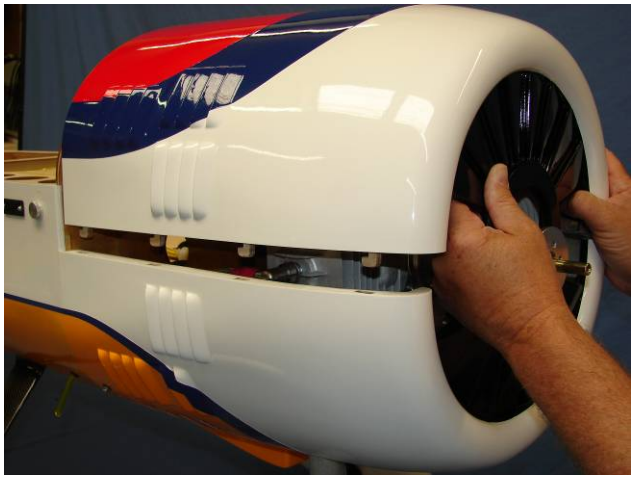
10. Mount cowl to bottom of fuse using
(4) 4-40x16mm button style hex head bolts
(4) #6 bonded washers.



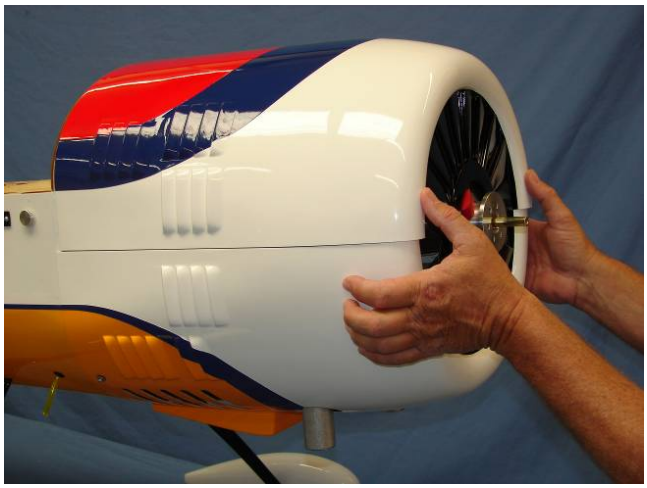
11. Mount inside center section of cowl using
(2) 4-40x 25mm hex head bolts
(2) #6 bonded washers

12. Attach top portion of cowl using the pre installed mounting tabs and slots.

Note: Paten pending interlocking cowl design

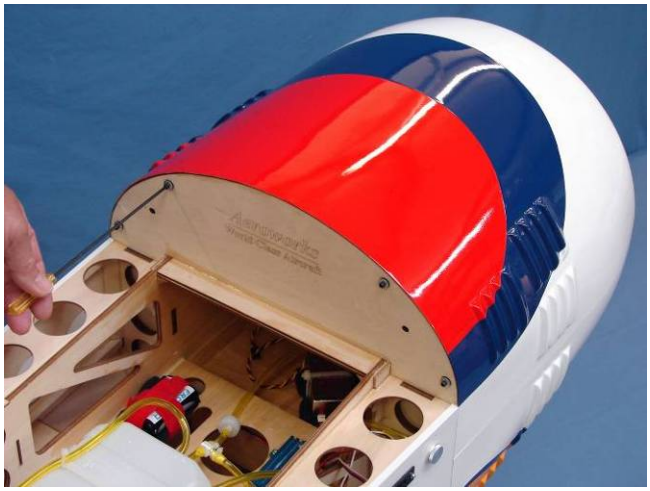


13. Once tabs are aligned with slots push top section of cowl back into position.



14. Finished cowl with top and bottom section aligned shown below.

15. Mount top inside section of cowl using
(4) 4-40x20mm hex head bolts
(4) #6 bonded washers



16. Finished cowl installation shown below

17. Secure front section of cowl using (2) T2.6x10mm flat head screws.

Cowl Installation with Greves Pipes

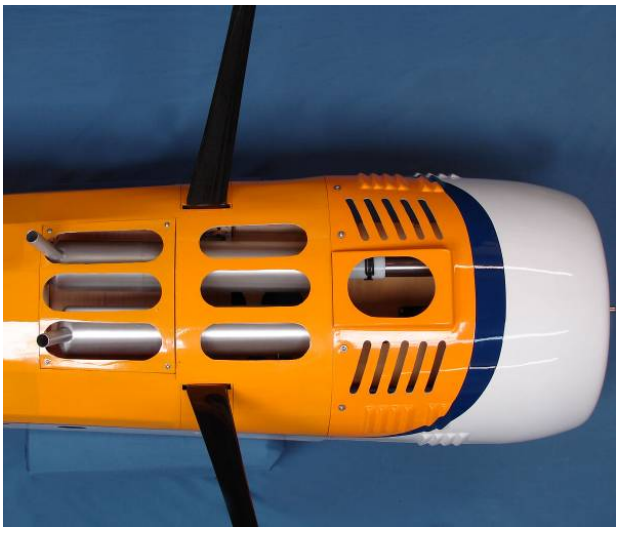
1. If using Greves pipes use the same cowl mounting steps as for standard mufflers. No other steps or required for mounting of the cowl. All hot air exit holes have been pre cut from the factory.

Always check the operating temperature of your engine to prevent any damage from occurring. Aeroworks is not responsible for damages incurred from improper engine cooling.

Cowl Installation with Canisters

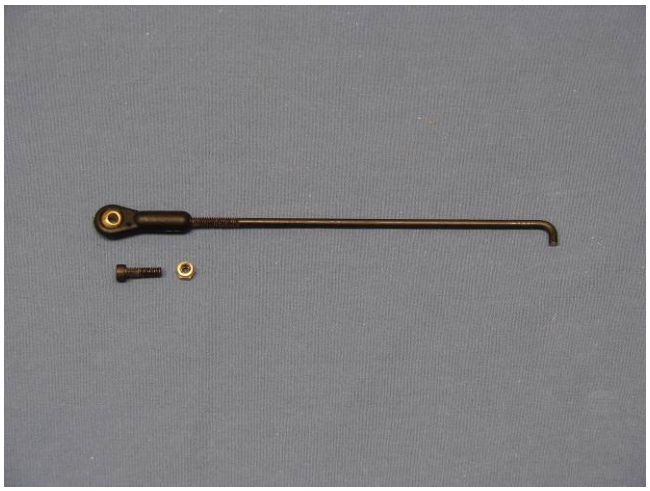
1. If using canister mufflers use the same cowl mounting steps as for standard mufflers. No other steps or required for mounting of the cowl. All hot air exit holes have been pre cut from the factory.

Always check the operating temperature of your engine to prevent any damage from occurring. Aeroworks is not responsible for damages incurred from improper engine cooling.

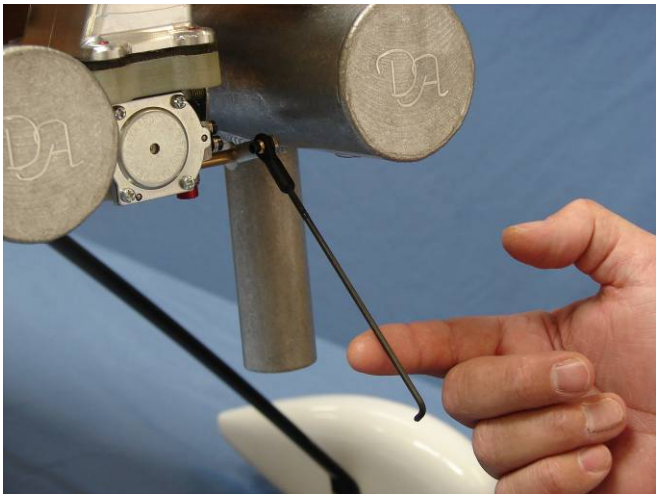


Manual Choke Pushrod Installation

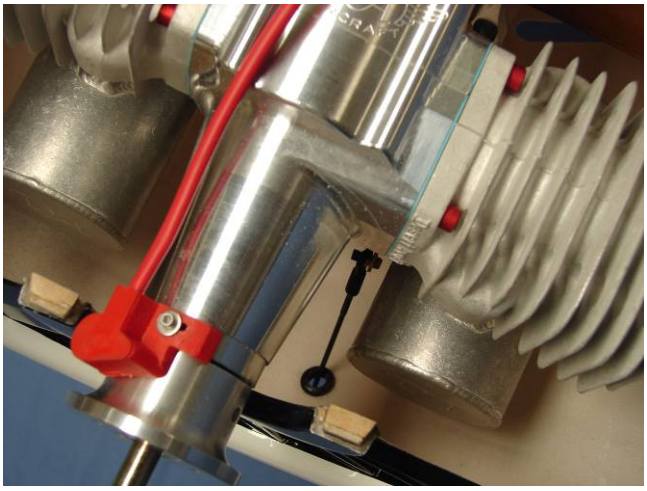
1. Gather the choke pushrod and ball link assembly shown below. Measure the length of the choke pushrod required to extend out of the front of the cowl when the choke control arm is fully pushed aft. Cut pushrod to correct length and make a 90º bend at the end of the pushrod as shown.



2. Attach the choke pushrod and ball link to the engine choke arm as shown. This will exit the bottom of the cowl for easy access.



3. Use supplied rubber grommet and install in cowl for professional look.



4. Finished choke pushrod installation shown below.

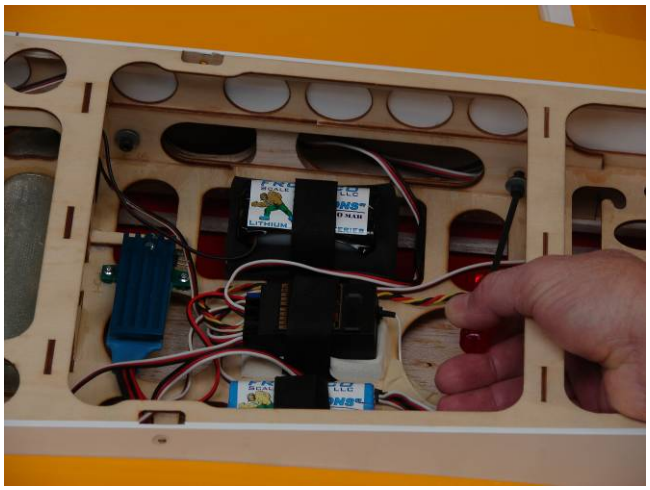
PRE-FLIGHT PREPARATION

1. Gather the (4) 8-32 wing mounting bolts, (4) #8 large rubber backed washers and (4) hair pins.

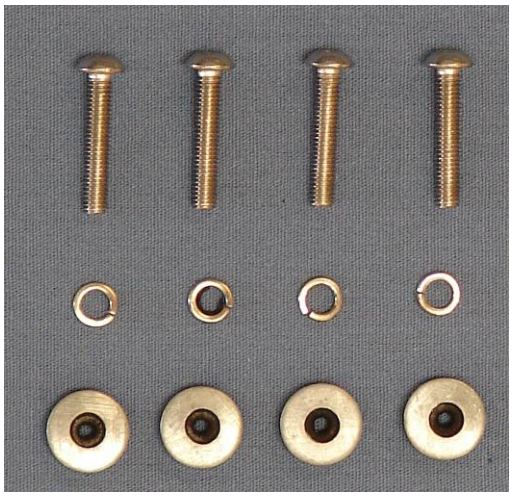
Note: Always check wing attachment bolts are securely tightened. We recommend using hair pins through the aluminum anti-rotation dowels for a second method of security.

We recommend using hair pins through the anti-rotation dowels for a second method of wing attachment.

2. Slide the wing tube in the fuse wing tube sleeve. Slide the wings on the wing tube and plug in the aileron servo connectors. Slide the rubber backed washers on the wing mounting bolts and insert bolts through the fuse side and into the wing root blind nuts. Tighten snugly but do not over tighten and crack the fuse or wing root wood.

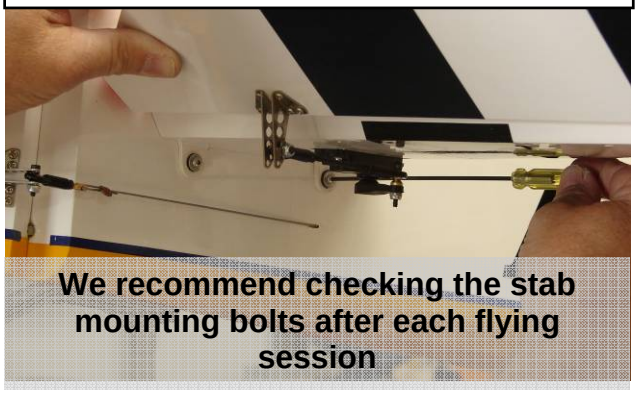


3. Gather the (4) 4-40 stab mounting bolts and (4) #6 small rubber backed washers.



4. Slide the stab tubes in the fuse stab tube sleeves (***short tube front, long tube rear***). Slide the stabs on the stab tube and plug in the elevator servo connectors. Slide the rubber backed washers on the stab mounting bolts and insert bolts through the stab mounting tabs and into the fuse blind nuts. Tighten snugly but do not over tighten and crack the stab mounting tabs or the fuse sides.

If you do not remove your stabs for transportation purposes. We recommend you use (*blue*) Loctite to help keep bolts from vibrating loose.



We recommend checking the stab mounting bolts after each flying session

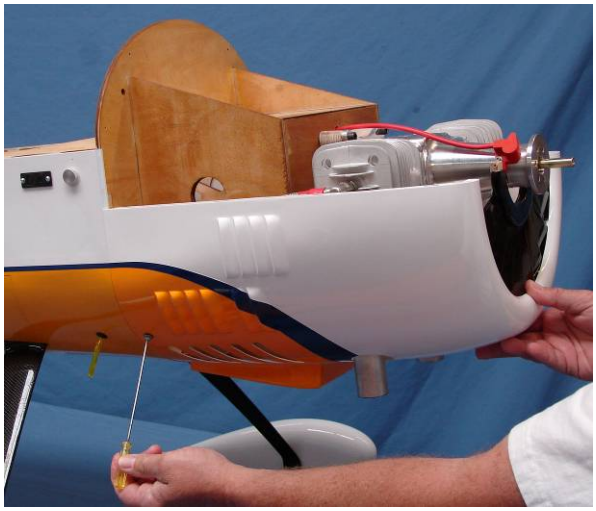
5. Gather the (10) 4-40 cowl mounting bolts and (10) #6 small rubber backed washers. Mount the cowl using the cowl mounting bolts and rubber backed washers. The rubber backed washers are to prevent the fiberglass cowl from cracking and keep bolts from coming loose from normal engine vibration.

(4) 4-40 x 20mm hex head
Top Inside Mount

(2) 4-40 x 25mm hex head
Center Inside Mount

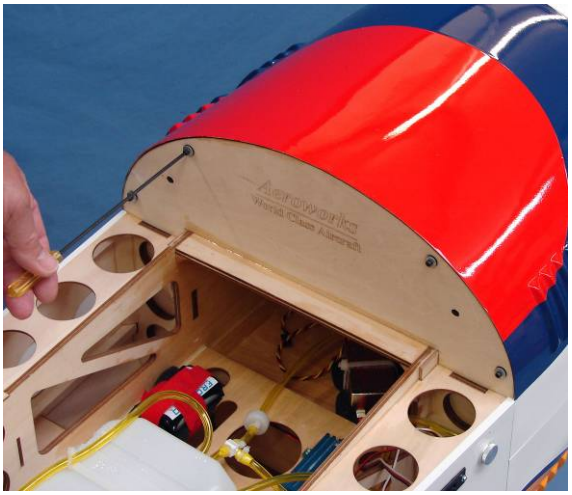
(4) 4-40 x 16mm button head
Bottom Outside Mount

6. Secure bottom section of cowl with 4-40 x 16mm button head bolts and #6 bonded washers.



7. Secure center section of cowl with 4-40 x 25mm hex head bolts and #6 bonded washers.

8. Secure top section of cowl with 4-40 x 20mm hex head bolts and #6 bonded washers.



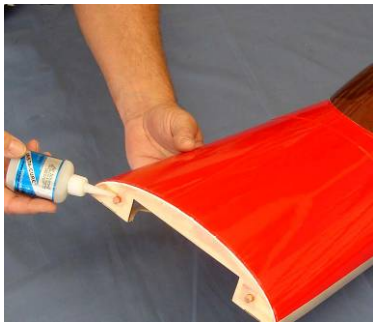
9. Secure front section of cowl using (2) T2.6x10mm flat head screws.

10. Gather the (4) 4-40 hatch mounting bolts and (4) #6 small rubber backed washers.

Note: It is highly recommended you apply thin CA glue to the front hold down dowels. This is a High vibration area and can loosen the front dowels.

Always check the front dowels are secure before each flying session

Us thin CA to secure front hatch hold down dowels



11. Slide the rubber backed washers on the hatch mounting bolts and insert bolts through the hatch mounting holes and into the fuse blind nuts. Tighten snugly but do not over tighten and crush the hatch or the fuse sides.

DECAL INSTALLATION

1. Decals supplied with the kit may vary from the photos below. Decal application steps will be similar.

   Gather supplied decals, transfer tape, ruler, scissors, hobby knife, plastic squeegee or credit card, Windex or Application fluid like ***Rapid Tac***. Also, a solution of 1 drop of dish detergent to a cup of water sprayed on the model will assist in proper positioning.

Note: Clean surface and tighten all covering before any decals are applied.

2. Factory placement of decals.

3. Factory placement of decals.

4. Factory placement of decals.

5. Cut transfer tape to accommodate decal size.

Note: Transfer tape will be reused. **DO NOT** throw away any transfer tape until decal placement is complete.

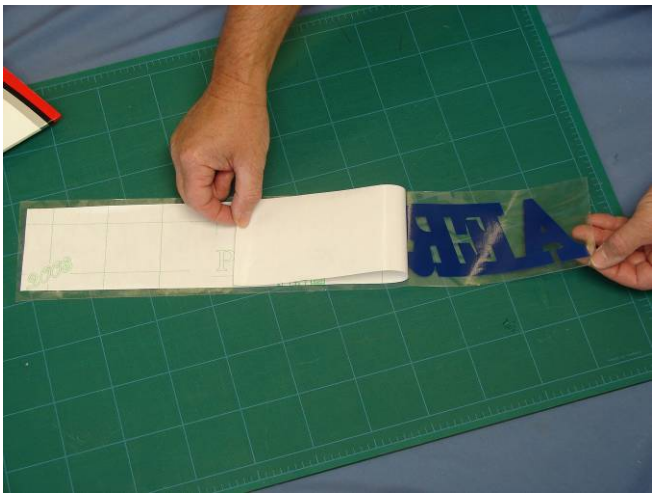
Decals supplied with the kit may vary from the photos below. Decal application steps will be similar.

6. Remove backing from Clear transfer tape.

7. Apply clear transfer tape over top of decal.

8. Press transfer tape to top of decal.

9. Peel backing from decal.



10. Spray model surface with application fluid, Windex or soapy water solution.

11. Spray back side of decal with application fluid, Windex or soapy water solution.

12. Position decal in proper location. Application fluid will allow decal to be moved slightly.

13. Using a plastic squeegee or credit card. Spread decal smooth and remove all excess application fluid. Let decal set until dry enough to be able to remove transfer tape with out removing decal. Do not leave until completely dry or transfer tape will be difficult to remove.

14. Pull transfer tape from top of decal. Take care not to pull away or damage decal.

15. Let decal dry completely before handling.

CENTER OF GRAVITY - CONTROL THROWS

Center of Gravity

Warning, DO NOT skip this step!

1. The recommended CG is **(4 1/2" to 4 3/4")** back from the wing leading edge at the wing tip as shown.

Note: During the test flights we found 4 3/4" to be the optimal C.G. location.

2. Balance the Yak 54 without fuel in the tank with the batteries installed and **READY TO FLY**. The engine, radio, servos, and batteries you use will determine the final weight and locations of equipment. Try to balance the model by moving the batteries and receiver before adding any ballast.

3. Start at recommended CG until you are comfortable with the flight characteristics of the aircraft. You may find this a bit nose heavy at first but that is fine to start with. After you are comfortable adjust the CG to suit your flying style in small steps, especially when shifting the CG toward the tail. Move the battery or add small stick on weights to the nose or tail as necessary.

Note: If additional nose weight is necessary we recommend moving the engine forward slightly by adding extra spacer or washers to move the C.G. forward. Try this before adding an additional weight.

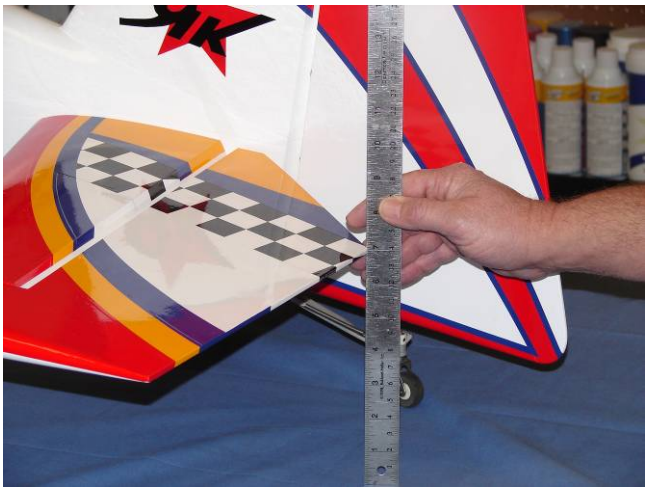
4. For aerobatic flying a more aft balance point is better. For smooth sport flying or precision pattern a more forward CG is better. An aircraft that is too nose heavy does not fly well and is difficult to land. A tail heavy aircraft is uncontrollable and will likely crash.

Control Throws

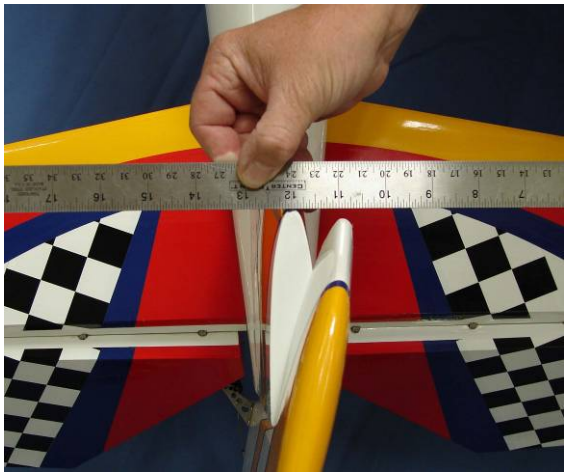
1. The amount of control throw should be adjusted using mechanical means as much as possible and then electronically with the radio. The control throws are shown in degrees and inches of deflection.

Aileron throw measured in inches at the widest point of the aileron.

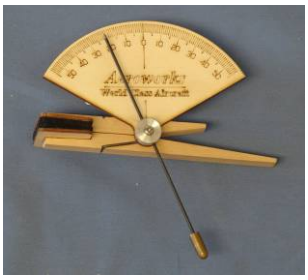
2. Elevator throw measured in inches at the widest point of the elevator



3. Rudder throw measured in inches from the rudder boost tab.



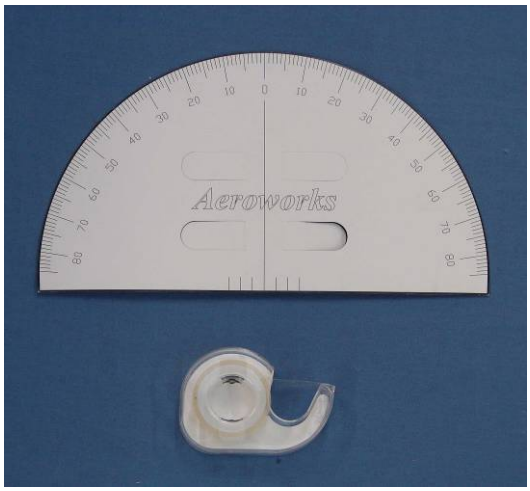
4. Use the **supplied** flight control deflection meter to measure the throws in degrees. It is recommended you level the model as shown.



5. Elevator throw measured in degrees. Locate throw meter at widest point of the elevator.

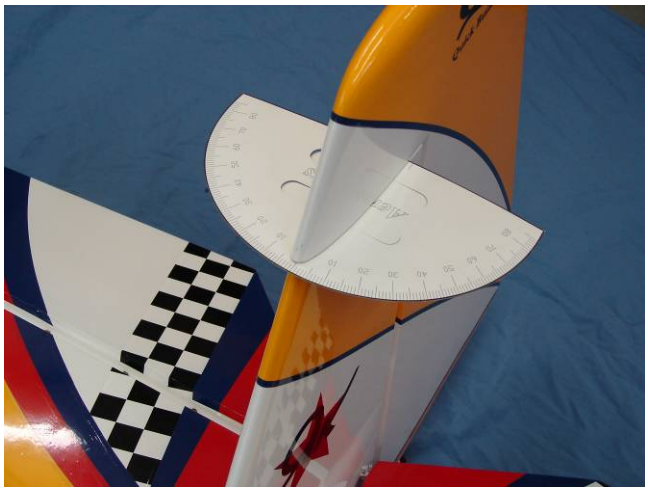
6. Aileron throw measured in degrees at widest point of the aileron.

7. Gather the Rudder Throw Meter (***Supplied***) and scotch tape.



8. Slide the throw meter under the rudder boost tab. Center the throw meter on the rudder using the centering marks on the meter to aid with alignment.

Note: Position throw meter to the front of the fin and rudder.



9. Bend the precut positioning tabs down around the fin.

10. Secure the tabs to the fin using scotch tape. As shown below

11. Degrees are measured at the tip of the boost tab as shown below.

Control Throw Deflection Table

	Low Rate	High Rate
Aileron	3 1/4" or 25˚ up 3 1/4" or 25˚ down	4" or 30˚ up 4" or 30˚ down
Rudder	2 1/2" or 25˚ left 2 1/2" or 25˚ right	3" or 35˚ left 3" or 35˚ right
Elevator	2 1/2" or 16˚ up 2 1/2" or 16˚ down	3 " or 22˚ up 3" or 22˚ down

For 3D flying use the following throws:

	3D Rate
Aileron	5 1/2" or 40˚ up 5 1/2" or 40˚ down
Rudder	4" or 40˚ left 4" or 40˚ right ***Full rudder deflection is typically recommended for all out 3D***
Elevator	7" or 50˚ up 7" or 50˚ down

Recommend Expediential:

15% expediential on low rates
30% expediential on high rates
60% expediential on 3D rates

Use the given rates as a starting point. Then adjust rates from there to suit your own flying style.

Preflight Check List

Center of Gravity: Check CG is set properly.

Engine: The engine should run smoothly at all throttle settings with smooth transition from idle to full throttle without stalling hesitation. Do not fly an unreliable engine. Read engine instructions including break in and tuning completely. Pay close attention to the engine temperature.

Flight Controls: Ensure all flight controls are free from binding and are centered. Check that all hinges are tight and will not pull out. Control linkages must be rigid and tight and have no slop. Confirm proper direction of ailerons, rudder, and elevator. Experienced flyers have lost airplanes due to reversed ailerons. Right roll is right up, left down. Left roll is left up, right down.

Batteries: Transmitter and receiver batteries are fully charged.

Fasteners: Check all wing bolts, hatch bolts, servo screws, control horn bolts, wheel collars, and clevis keepers are tight and secure. Use Loctite were necessary.

Covering: Check all seems and overlaps are secure and have not lifted. If any air gets underneath the covering it may pull the covering away form the plane and can cause the model to crash. Always check before each flight. A roll of clear tape in you flight box can be used for any field repairs. Once you get the model back to your work shop use heat and or Thin CA glue to secure covering.

Radio: Check trims and sub trims are set to neutral and controls centered. Check rate and condition switches set properly. Check the receiver antenna is fully extended and not reversed on it self. Check radio antenna is fully telescoped.

Fuel: Fill the fuel tank before each flight.

Range check: Do a range check with and without the engine running in accordance with the radio manufacturer instructions. If there is insufficient range or a large reduction with the engine running, do not fly until it is resolved!

Aerobatics

The 150cc Yak 54 ***QB*** is capable of any aerobatic maneuver. After you gain some confidence and little experience flying the airplane you can cut loose and perform any maneuver you can think of. Here is a list of some of the more popular aerobatic and 3D maneuvers you can try:

- Loops and rolls
- Knife edge flight
- Stall turns
- Snap rolls
- 2, 4, and 8 point rolls
- Slow rolls
- Spins upright and inverted
- Flat Spins upright and inverted
- Harriers upright and inverted
- Water falls
- Torque Rolls
- Rolling circles
- Rolling harrier

The sky and your imagination are you only limits.

FLY and ENJOY!

AEROWORKS

World Class Aircraft

Yak 54

CUSTOMER NOTES